

Additional chart coverage may be found in CATP2, Catalog of Nautical Charts.

SECTOR 4 — CHART INFORMATION

SECTOR 4

NORWAY—SOUTHEAST COAST—OSLOFJORDEN

Plan.—This sector describes the SE coast of Norway including Oslofjorden and the approaches, between Helgerodtangen, the W entrance point of Oslofjorden, and Saekken, a waterway about 21 miles ESE. The description is from sea inland, for Oslofjorden, and from W to E for the approaches to Saekken.

General Remarks

4.1 Oslofjorden, the most extensive of all the inlets on the SE coast of Norway, extends inland from its seaward entrance for a distance of 57 miles to Oslo, the principal metropolis and administrative center of Norway. It branches to the W, about midway along its length, into the lesser inlet Dramsfjorden, and in its SE environs opens out into a large, irregular coastal bight which, is choked by numerous islands. Hvaler, leads, in the N, to the river Glama and, in the E, to the minor inlet Iddefjorden. Slagenstangen and Horten lie on Oslofjorden W side with Moss on the E side; Drammen lies at the head of Dramsfjorden; Fredrikstad and Sarpsborg lie on Glama; and Halden lies in Iddefjorden.

Depths in most parts of Oslofjorden, with few exceptions, are adequate for ocean-going vessels. The exceptions are: in Svinesund (in the approaches to Iddefjorden); in Moss Kanal (in the approaches to Fredrikstad and Sarpsborg.); in Svelvikstrommen (between the inner and outer parts of Dramsfjorden), and in Vestre Lop (in Oslo harbor entrance).

Ice.—Ice occurs throughout Oslofjorden, particularly during January and February. During severe winters, a S wind can drive drift ice from the Kattegat into the inlet for a short period of time, and this may block the narrower waterways hindering navigation. In general, the main channel to Oslo and other channels to secondary ports and harbors are kept open to shipping by icebreakers.

Tides—Currents.—Currents from the Kattegat set N along the Swedish coast as far as the islands of Kosterøarna, where they swing NW, set across Oslofjorden entrance and continue on down the Norwegian coast. Currents within Oslofjorden proper are variable and largely influenced by meteorological conditions. As a result, S winds set up a N-bound current and raise the water level while N winds bring about the opposite effect. In general, the N-bound current flows with its greatest strength along Oslofjorden's E side while the S-bound current sets strongest along the W side. In some of the more narrow waterways, currents can reach a velocity to be of concern to shipping. Currents within Oslofjorden's SE environs are strongly influenced by fresh water discharge from Glama, as well as by meteorological conditions, which generally set S or SW.

4.2 Aspect.—**Bjornerodpiggen** (59°01'N., 11°25'E.), 224m high, the summit of the mountain Loverasfjallet, is the

highest elevation on the W side of Iddefjorden, and during clear weather is the first to be seen. The **Kosterøarne Islands** (58°53'N., 11°02'E.) are often seen before higher inland elevations during periods of poor visibility. Dragonkullen, 168m high, rises 6 miles NNW of Bjornerodpiggen; Hjelmekollen, a hill, rises 0.75 miles WNW of Dragonkullen. **Vagnarbergen** (59°02'N., 11°09'E.) a range of hills rising to a height of 120m, on the Swedish coast in the SW approach to Iddefjorden, is abrupt on its N side. It is visible for a distance of 20 miles. **Bankerodkollen** (59°06'N., 10°54'E.) and Skjelsbuveten, 0.45 mile SSE, are the two highest elevations of the island Vesteroy; they are conspicuous from SW. Onsoyknipen, 7.5 miles NNW of Bankerodkollen, is a hill with the appearance of a lengthy ridge. It is topped by two remarkable elevations.

Pilotage.—Pilotage within Oslofjorden is compulsory for vessels of 500 grt and all vessels, irrespective of size, carrying dangerous and/or polluting cargo.

Vessels should send a request for pilotage 24 hours in advance to Horten Pilot Dispatch Center by fax, telephone, or VHF channel 13. The message should include name, call sign, nationality, ETA, destination, draft, brief details of cargo, tonnage, length, beam, and any other information as appropriate. Requests can be sent via the agent.

Vessels should then send a confirmation of the request for pilotage and an ETA 5 and 2 hours prior to arrival.

Generally, pilots board vessels about 1.5 miles E of Store Faerder (59°04.5'N., 10°34.5'E.).

4.3 Caution.—Numerous danger and firing exercise areas lie in the seaward approaches to Oslofjorden and extend intermittently both into the inlet, for a distance of about 30 miles, and over much of its SE environs. See Pub. 140 Sailing Directions (Planning Guide) North Atlantic Ocean, Baltic Sea, North Sea, and the Mediterranean Sea.

Submarine cables and pipelines connect the islands and the mainland and they are shown on the chart; however, where pipelines are close together, only one may be charted.

Gas from a damaged oil or gas pipeline could cause an explosion or other serious hazard including loss of buoyancy to any vessel in the vicinity. Pipelines are not always on or covered under the sea bed and their presence may effectively reduce the charted depth by as much as 2 m.

In Norwegian waters, some submarine power cables may conduct high voltages; contact with or closing into them poses danger. Mariners are to be aware that some of these cables may not be charted.

Vessel Traffic Service.—A mandatory Vessel Traffic Service system (VTS) became operational in Oslofjorden on 01 January 1999.

The VTS area is divided into two sectors. Sector 1, S of 59°46'N, is operated by Horten VTS Center; and Sector 2, N of



FAERDER LIGHTHOUSE

59°46'N, is operated by Oslo Port VTS Center. The S most part of the VTS area (Sector 1) includes approximately the waters E of the meridian of Tonsberg Tonne (about 10°17'E.) and N of the latitude of Sydostgrunnen (about 58°57'N.).

The following vessels must participate:

1. All vessels 24m and over in length.
2. All vessels carrying hazardous and/or polluting cargo in bulk.
3. All vessels carrying paying passengers within Sector 2.

The following frequencies are used:

1. Sector 1 (S of Hollenderbaen Light)—VHF channel 18.
2. Sector 1 (N of Hollenderbaen Light)—VHF channel 19.
3. Sector 2—VHF channel 20.

All vessels, except those carrying dangerous goods, must report 1 hour before entry into the VTS area to the appropriate Control Center by VHF, E-mail, or Fax. Vessels carrying dangerous goods must report 6 hours before entry. Clearance to enter the VTS area must be obtained (also to anchor).

All vessels must then report to Horton Control Center on VHF Channel 18 when entering the VTS area.

Ferries operating local transits are only required to report immediately before leaving the berth.

When transiting the area or at anchor, vessels must keep a continuous watch on the designated frequency.

VTS communications shall be in English or a Scandinavian language.

Permission to change frequencies or end a VHF watch must be obtained from the VTS Control Center.

VTS operations, traffic information, or clearances do not relieve the Master of the responsibility for safe navigation of the vessel.

4.4 Directions.—The main route for vessels navigating within Oslofjorden is formed by the appropriate lanes of the Traffic Separation Schemes (See 4.9 Directions).

Vessels, having to navigate in Oslofjorden SE from Store Faerder pilot station, bound for Fredrikstad or Sarpsborg, must pass either N of Struten light or S of Hvaler and then through Loperen. If bound for Iddefjorden, vessels must proceed to pass S of Hvaler and then through Saekken.

Vessels, navigating in Oslofjorden, SE from Saekken pilot station, bound for Halden or Fredrikstad, must proceed through Saekken and continue either by way of Svinesund or the passage N of Hvaler. If bound for Fredrikstad, then a vessel must proceed by way of Loperen.

Regulations.—The following are extracts from the Norwegian marine regulations.

Additional signals may be required by certain tankers navigating in Oslofjorden and in waters outside Risavika off Stavanger.

Tankers of 40,000 dwt or more when navigating within the territorial waters to and from Slagenstangen and Risavika, and tankers of 10,000 dwt or more when navigating within Filivet Lighthouse to and from oil installations in the inner part of Oslofjorden shall exhibit the signals indicating that they are hampered (constrained) in their ability to comply with the steering and sailing rules and other vessels must not impede their safe navigation.

Waterway regulations in Norwegian internal waters differ from those in 72 COLREGS. Details of these regulations should be obtained locally.

Oslofjorden—Main Channel

4.5 Oslofjorden (59°30'N., 10°30'E.) is entered between **Lille Faerder** (59°02'N., 10°31'E.) and Torbjornskjaer, 8 miles ESE; the fjord extends about 57 miles N, at its head to Oslo harbor. From the entrance, the fjord is comparatively open for a distance of about 40 miles before entering the narrowest and most intricate part of the entire passage, which is the 6 mile reach between Drobak and Spro light. Once through this reach, the passage leads to relatively open water for the remaining distance of about 11 miles through numerous isolated submerged dangers.

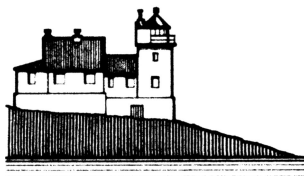
Directions.—Several Traffic Separation Schemes (TSS), which may best be seen on the chart, have been established in Oslofjorden and lead from the vicinity of the pilot boarding area to the head of the fjord. These Traffic Separation Schemes are not IMO-adopted; however, the Norwegian government advises vessels that Rule 10 of the 72 COLREGS applies.

The areas lying between the ends of some adjacent Traffic Separation Schemes are designated as "Precautionary Areas" where vessels are to navigate with extreme caution.

Oslofjorden—West Side

4.6 Helgerodtangen to Horten.—From Helgerodtangen, the S extremity of the Tjome island, to Horten, about 21 miles

N, the W side of the fjord is divided into two distinct parts. The S part is an intricate complex of islands and waterways, including the heavily populated islands of Tjome and Notteroy, a multitude of lesser islands and submerged dangers which lie scattered to the E. The N part, by contrast, is a comparatively regular and well populated level, forested segment of the mainland coast, that falls off into Oslofjorden in a gentle slope. **Bastoy** (59°23'N., 10°32'E.) is a small flat island lying 1.5 miles SSE of Horten. It is distinctive from the S due to its dark forested color and from the E it is distinctive by the isthmus which separates the N part of the island from its S.



BASTOY (DISUSED LIGHTHOUSE) (59°23.1'N., 10°32.5'E.)

Submarine cables are laid in an area extending from the S point of Bastoy SW to the W shore of Oslofjorden and E from the S point of Bastoy to the E shore of the fjord.

Anchoring and fishing are prohibited within an area which extends E from Horten across Oslofjorden to Gullholmen. The N limit is the parallel of Gullholmen; the S limit is the parallel of 59°25'N.; and the E limit is the meridian of Gullholmen Light.

Current direction and velocity are irregular throughout and largely dependent on wind conditions. In the waterways S of Valloy, currents are particularly irregular and can reach such a velocity as to be of concern to navigation. North of Valloy, current direction can come under the influence of fresh water discharge from rivers N of Horten such that flow in Bastoyrenna, the passage W of Bastoy, can often set in a direction opposite to that in Oslofjorden, E of the island.

Deep Water Passages

4.7 Helgerodtangen to Lille Faerder.—Helgerodtangen (59°03'N., 10°25'E.) is fronted by a scattering of awash and submerged rocks to Tjomeboskatet, a rock, about 2.5 miles S, which constitutes the danger farthest to sea. Lille Faerder, about 4 miles ESE of Helgerodtangen, is comprised of three low rocky islets; Faerder Light, one of the oldest light stations in Norway, stands on the middle islet. Tristeingrunnen (59°01'N., 10°31'E.), a submerged rocky patch about 0.75 mile SSW of Faerder Light, is the farthest seaward danger on the W side of the principal passage through the entrance to Oslofjorden.

Depths vary greatly within the fjord, particularly in the N part. The S part of the channel passes through deep water which is very uneven, with variations of over 100m within a distance of 560m in the vicinity of **Nyrgrunnen** (59°36'N., 10°38'E.) and again 3 miles N. Least charted depth in the fairway is 15m in position (59°40.1'N., 10°37.1'E.), to the W of Drobakgrunnen.

Sea level within the fjord can be affected by the winds in the surrounding area; since they are not the same in Oslofjorden

and Kattegat as they are in the Skagerrak. The W and NW winds in Skagerrak combine with S winds in Kattegat and Oslofjorden driving water into the fjord and raising the sea level. Similarly, E and SE winds in Skagerrak combine with N winds in Oslofjorden and Kattegat reducing the sea level.

From a position E of **Filtvet Light** (59°34'N., 10°37'E.) the main channel continues N for about 5 miles through a part of the fjord which is narrow but clear in the fairway. From the vicinity of **Drobak** (59°40'N., 10°38'E.) the main channel follows the E side of the fjord, over the least charted depth in the channel and through the narrows of **Drobaksundet** (59°40'N., 10°37'E.). Then continues N through the channel between the E shore and adjacent islands, to a position W of **Spro Light** (59°46'N., 10°35'E.). From a position NW of Spro the track continues N to pass W of **Gasungane** (59°50'N., 10°35'E.), then NE to a position off **Nesodden Light** (59°52'N., 10°39'E.) which is at the entrance to Oslo Havn.

Caution.—Depths of 3m and 3.6m lie about 0.4 mile SSE and 0.75 mile S, respectively, of Tristeingrunnen.

Aspect.—When navigating in the area between Helgerodtangen and Lille Faerder: Toras located N of Helgerodtangen, is described above under Tonsbergfjorden general aspect. **Sandoyhovuda** (59°05'N., 10°28'E.), two conspicuous hillocks near the NW extremity of Sandoya. Store Faerder, N of Lille Faerder, a comparatively high, dark gray, small barren rocky island which, surmounted by the ruins of an abandoned lighthouse. It has a deep cleft on its S side conspicuous from E and W. The islets close seaward of Store Faerder are somewhat lower and lighter in color. Klovningen, a large, 22m high, reef-fringed islet about 1.25 miles E of Helgerodtangen, is marked near its NW extremity by a mast surmounted by a black barrel topmark.

Several deepwater passages, available to smaller vessels with local knowledge, lead through the many off-lying dangers and then into the sheltered inner waters within the entrance to Oslofjorden, namely: Rossesundet, Sandoyundet and Store Faerder W side passage.

4.8 Rossesundet (59°04'N., 10°26'E.) is the narrow passage formed between Tjome and the islands Vasser and Brotsoy to the E. It is fronted seaward by numerous awash and submerged dangers which, with an onshore wind, become so characterized by surf and breakers as to appear impassable. Depths in the preferred channel through the S entrance shoal to a least charted value of 8m (1973) and then increase for the greater length of the passage before shoaling once more at the N entrance.

Currents are almost always noticeable and, at times, can become strong enough to encumber navigation.

Otterstig (59°05'N., 10°25'E.), a small community on the W side of Rossesundet, fronts on a good natural harbor which has anchorage for small vessels in 10m, mud, in a position between the shore and two off-lying submerged rocks. Care is necessary to avoid a submarine pipeline laid across the sound and the shore reef and two rocks. **Ormelet** (59°06'N., 10°25'E.), a small community about 2.5 miles within the entrance to

Rossesundet, has a short wooden berthing facility with depths of 3.3 to 3.7m alongside. A road bridge, with a vertical clearance of 14m, spans Rossesundet close S of Ormelet.

4.9 Sandøysundet (59°04'N., 10°28'E.), is formed between Vasser and the island Sandøya, on the E. The fairway throughout is narrowed by coastal banks which in the seaward entrance almost completely choke off access save for extremely narrow channels passing E and W of a mid-lying drying reef. The E channel has a least depth of 4.5m and the W channel 6m.

Sandøysund, near the N entrance to Sandøysundet, has a small harbor subject to silting which requires dredging to maintain a 3m depth.

A pilot station is situated at the village of **Sandøysund** (59°05'N., 10°27'E.).

Sandøysundsleia (59°10'N., 10°28'E.), known locally as Leia, is a narrow, deepwater inner passage which leads through the many islets that lie along the E sides of Tjome and Notteroy. It extends about 10 miles N between Sandøya and Valloybukta. It connects with Vrengen and Tonsberg, to the W, and joins with numerous passages coming from Oslofjorden, to the E.

Navigation is not considered particularly difficult, but transit is recommended during clear weather and with local knowledge because of dangers which considerably narrow the fairway in several places.

Depths throughout Sandøysundsleia are ample and generally exceed 20m in the fairway, though submerged rocks with shallow depths are numerous and often times lie close aboard the navigable route.

Holteskjaerkilen (59°09'N., 10°26'E.), a foul bay near the NE extremity of Tjome, has good anchorage for small vessels in 8 to 17m, clay, with scattered patches of stone, in a position just within the entrance. Submarine cables exist across the narrow channel between the W part of Buroy and Tjome, also between the N end of Buroy and Haholmen, an islet close W.

Makerøyflakket (59°09'N., 10°27'E.), in the E approach to Vrengen, has anchorage in a position with the E extremities of Søndre Aroya and Nordre Aroya in range 016°, for large vessels in depths of 15 to 22m, in sand and clay. The anchorage is not recommended with S winds and becomes unsuitable for small vessels when S winds freshen.

Aroysundet (59°10'N., 10°27'E.), the shallow water passage between Notteroy and Søndre and Nordre Aroya, has anchorage within its S entrance for large vessels in 11 to 15m, mud.

4.10 The E approaches made through numerous passages leading from Oslofjorden to Sandøysundsleia and Tonsberg are mainly deep throughout, but fairways become considerably narrowed by the encumbering submerged dangers. Transit through the passage requires local knowledge.

Sandøysund is reached by way of the Busteinlopet approach; Vrengen, by way of the Leisteinlopet approach; and Tonsberg, by way of Lindholmkjela, Huikjela, Bolaerne NE side, Granabasundet, and Torgersøygapet approaches.

Busteinlopet (59°06'N., 10°28'E.) is the water area formed between Sandøya and the islets Matkollen, Vestre Bustein and

Ostre Bustein which lie from 0.65 mile N to 0.8 mile NE, respectively, from Sandøya. Vestre Bustein 43m high; when viewed from the E has a conspicuously abrupt slope on its SW side.

Vessels bound for Sandøysund or the S reaches of Sandøysundsleia, steer out of Oslofjorden on a heading to pass S of **Darami** (59°05'N., 10°32'E.), submerged rocks lying about 0.85 mile N of Store Faerder, and Melleskjaerhausen, submerged rocks marked by a buoy, which lie 0.5 mile WNW of Darami. Vessels then proceed to pass S of the islet Melleskjaer and Ostre Bustein, leaving the rocks of **Kringene** (59°05'N., 10°30'E.) to port, and then passing between the dangers lying N of Sandøya and the 7.5m danger close SW of Matkollen, where they proceed to destination.

Vessels coming from sea may pass W of Store Faerder, as previously described, and then proceed to pass between the dangers extending N from **Kaviklorton** (59°05'N., 10°29'E.), which lies close off the NE extremity of Sandøya, and Kringene, which lies about 0.5 mile NE of Kaviklorton, where they steer to port and join the track from Oslofjorden.

Leisteinlopet (59°08'N., 10°32'E.), the most direct approach to Vrengen from sea, is the passage leading between **Leistein** (59°09'N., 10°30'E.) and the islet group Leisteinskjaerne, which lies about 0.4 mile SSW of Leistein. Drillen, a secondary passage midway between Vestre Bustein and Leisteinlopet, leads into Sandøysundsleia.

Leistein rises to a height of 28m on its NW side; this height is surmounted by a conspicuous beacon. Ildverket, an islet about 1.5 miles SSW of Leistein, has a conspicuous rounded hill near its SW side; it separates Drillen and Sandøysundsleia.

Lindholmkjela (59°11'N., 10°30'E.), the farthest S of the more direct passages to Tonsberg, is entered between Leistein and the beacon standing in the middle of the islet group **Vierskjaera** (59°09'N., 10°33'E.), 1.5 miles NE.

4.11 Huikjela (59°10'N., 10°34'E.), the next passage NE of Lindholmkjela, is the most direct and least encumbered of the S approaches to Tonsberg; it is entered between the beacon on Vierskjaera and the reef fringed islet Store Rauer about 1.25 miles NE. Store Hui, 0.9 mile N of the beacon on Vierskjaera, is conspicuous due to the steep slope of the hill in the S part of the islet; the hill is 29m high.

The area E of the islet **Gasoy** (59°12'N., 10°31'E.) is prohibited anchorage; it serves needs incidental to coast artillery and other military exercises.

Prohibited Area.—Unauthorized approach is prohibited in an area extending 50m from the NE and E coasts of Bolaerne in an area whose limits are shown on the chart and from Vestre Bolaerne to the S end of Skarvesete at the S end of the group. The prohibited area is bounded by a line extending 50m seaward between the S end of Skarvesete, the S end of Langholmen, the W side of Sviveskallen, the N island of Kultene, and the W side of Vestre Bolaerne.

Anchoring, fishing, and diving are prohibited in an area W of the N part of Bolaerne. The SE limit is bounded by a line joining the N ends of Skjelloroy, Trollholmen, Hatten, and the N island of Kultene.

Veten (59°10'N., 10°26'E.), a hill in the SE part of Notteroy, rises to a height of 99m; it is the highest hill on either Tjome or



SLAGENSTANGEN OIL TERMINAL

Notteroy, and is a conspicuous mark from the E. Slottsfjelltnar, a tower standing in the W part of Tonsberg; is conspicuous from the SE; with bearings greater than 325° it is obscured by the trees on the island of Foyenland.

Bolaerne (59°13'N., 10°33'E.), a passage leading to Tonsberg and Valloybukta, is formed on the S side by a chain of islands extending about 2 miles with the same name. The three larger islets are Vestre Bolaerne, Mellom Bolaerne and Ostre Bolaerne, named from NW to SE. This passage is quite deep throughout, but the inner reaches, in particular, are intricate.

It is preferred to enter the passage in a position NE of the drying rocks **Hestebaen** (59°13'N., 10°34'E.), which lie about 0.15 mile NE of the N extremity of Ostre Bolaerne, and proceed to pass on either side of the 6m depths Kvernesbaane, 1.5 miles NW of Hestebaen. The vessel then passes between the dangers of Ormoysteinene to starboard, and Sorensbaen, to port, where they then proceed to their destination.

4.12 Granabasundet (59°15'N., 10°31'E.) is the most common access to the N reaches of Sandoysundsleia from Oslofjorden. A beacon on the islet **Torgersoy** (59°15'N., 10°30'E.) marks the approach.

Fjaerskjaer (59°14'N., 10°30'E.), E of Granabasundet, parallels that passage and provides vessels, with local knowledge, a wider and deeper access to Sandoysundsleia. It is entered between the islet Fjaerskjaer and the submerged rock Langgrunnen. A course then directed to pass between Langskjaera and Espelund leads S through Sandoysundsleia.

Torgersoygapet (59°15'N., 10°31'E.), the farthest N of the passages to Tonsberg, is formed by the islet Torgersoy and Hestebaen, a reef whose S part lies about 0.1 mile N of the light on the N end of Torgersoy. The passage is encumbered by a depth of 5.5m, that lies 0.1 mile NE of the light.

Vessels from the E enter Torgersoygapet on a heading of 260° and pass S of the 5.5m depth, then along the N side of Torgersoy at a distance of about 91m where they enter Valloybukta, and either proceed to anchorage close N or continue on to Tonsberg.

Caution.—A submarine pipeline is laid across Valloybukta from the NW end of Torgersoy 0.9 mile NW to Klopp Boat Harbor.

4.13 Valloy (Vallo) (59°16'N., 10°30'E.) (World Port Index No. 23730) is situated on a peninsula that forms the NE side of Valloybukta; it is the site of a refinery. There are two wooden quays on the E side of Valloybukta, 0.45 mile NNW of Torgersoy; the largest berth, on the NW side of the S quay, has a length of 82m, with depths of 8.3 to 10.1m alongside the outer 65m. In Valloybukta in depths of 13.5 to 15m, clay, in a position WNW of the quays. Care must be taken to avoid the submarine cable which crosses from Torgersoy NW to the mainland. It should be noted that winds from the S and SE can send a sea into the anchorage. Pilotage from the pilot station E of Store Faerder is required.

4.14 Slagenstangen (59°19'N., 10°32'E.) (World Port Index No. 23736), a point on the W shore of Oslofjorden about 20 miles N of Faerder Light and 3.5 miles NNW of Valloy, is

the site of a coastal petroleum refinery. The port authority is Norske ESSO within Tonsberg Harbor District.

Wind velocity is seldom above 21 knots; the direction is most frequently from N to NE and less frequent from the S. The current most often sets SE across the face of the berthing facility. If the wind velocity reaches 25 knots or the current 0.7 knots, as determined by instruments at the berthing facilities, vessels should prepare to get underway. Ice is negligible.

Approaches.—The approach to the Oslofjord to the Skagerrak are free of any navigational dangers and there is deep water close to the coast. Tankers of 40,000 dwt or larger are to keep a minimum distance of 15 nautical miles off the Norwegian coast until at the entrance to Oslofjord where the traffic separation schemes have been established inside Norwegian territorial waters.

Tankers of 20,000 dwt and above, carrying crude oil and laden to a draft of less than 35m can be escorted by a tug to and from Slagen.

Tankers up to 350m in length with a draft of 20m can berth at Berth No. 1 that is designated for vessels of 250,000 dwt, where the alongside depth is 21m. When the pier is occupied by more than one vessel engaged in cargo operations, one or two tugs are kept on stand by at the terminal. Usually tugs are made fast during the passage between Slagentangen lighted buoy and the terminal; ship's lines are provided.

Depths—Limitations.—The jetty is oriented N-S and enclosed by submersible oil boom that is fixed to the sea bed approximately 125m N to NW of the pier head, then continues along the W side of the pier to the shore. Again, from N to NE of the pier head, the area extends approximately 250m, and continues along E of the pier to the shore. Anchor should not be used within the area contained by the boom, except in an emergency.

The pier, 10m wide, protrudes about 180m NNE from the shore, then aligns N extending 440m further offshore with a platform, 30m wide and 130m long at the mid-section along its N stretch.

On the E side of the pier is Berth No. 1, equipped with shore based mooring winches, where VLCCs, with maximum size of 250,000 dwt, berth. On the W side are Berth Nos. 2 & 3, where smaller tankers of 25,000 dwt berth.

Approaches to the berths are usually made with the flow of the current that is influencing at the time of berthing period, and in most instances the current sets SE. The rate of currents are read electronically at the Harbor Office and relayed to the approaching ship. All movements of vessels to and from the berths are discussed with the Harbor Office on Slagen Radio channel 14.

Pilotage.—Pilotage is compulsory. Agents should be notified with full particulars 72 hours before vessel's arrival at the pilot station. The pilot embarks from the station E of Store Faerder, but larger vessels embark a docking pilot close ENE of Slagenstangen or near Slagenstangen lighted buoy. The docking pilot is stationed at Horten. Tug assistance can be requested through the harbormaster's office on VHF channel 14.

Anchorage.—Three anchorage areas, designated A, B, and C, and a prohibited anchorage area lie N of the oil refinery quay, they are best seen on the chart.

Anchorage particulars at the N of the pierhead are advised by the pilot or by Slagen Harbor Office on VHF channel 14.

4.15 Asgardstrand (59°21'N., 10°28'E.) (World Port Index No. 23740), about 2.75 miles NW of Slagenstangen point, is a small summer resort with two small craft harbors protected by breakwaters. Anchorage may be taken in 24m NE of the breakwaters. A prohibited anchorage extends about 0.45 mile seaward from a position on shore about 0.35 mile N of the N breakwater; the N limit of the prohibited area lies 0.2 mile farther N.

Kalegrunnen, a rocky patch with a least charted depth of 9m, lies about 0.4 mile ESE of Asgardstrand. Vestre Smaskjeret, 3m high and encompassed by shoal water, lies about 0.4 mile SSE of Kalegrunnen, and Ostre Smaskjeret, also surrounded by foul ground, lies 0.15 mile NE of Vestre Smaskjeret. Submarine cables extend NE from the shore, NW of Slagenstangen, and pass between Kalegrunnen on the NW and the two islets Vestre and Ostre Smaskjeret on the SE.

Horten (59°25'N., 10°30'E.)

World Port Index No. 23750

4.16 Horten, a coastal port, is located 6 miles NNW of Slagenstangen point. The port area is divided into an outer, or commercial harbor, and an inner harbor which is the headquarters of the Royal Norwegian Navy. The outer harbor is bound on the S side by a line from the W extremity of the island **Bastoy** (59°23'N., 10°32'E.) W to Borre Church; on the E from Bastoy light about 6 miles NNW to the islet Molen, and on the N by a line from the S point of Molen, SW to Varnestangen, a point of land. The Naval harbor, which is prohibited to foreign vessels, extends from the beacon at **Moringen** (59°26'N., 10°30'E.) N to the E extremity of Vealos then to the N extremity of Osteroya and Lovoya, situated 1.5 miles NW of Moringen.

Range lights, in line bearing 187° situated 0.8 mile and 7m SSW of Vealos lead into the harbor through a buoyed channel.

Ice.—Ice does not hinder the outer harbor but the inner harbor must be cleared.

Tides—Currents.—Water levels do vary greatly but they can be strongly influenced by meteorological conditions. Springtime currents, in the area N of Horten, reportedly set S and in the entrance to the inner harbor may reach a velocity of 2 knots.

Depths—Limitations.—There are depths alongside the principal berths up to 11m. Ro-ro facilities are available and further facilities are planned. Hortenskraken, marked by buoys and with a least charted depth of 1.5m, lies about 0.6 mile NE of the main quay.

Quays are described in order from the S.

Hortensbrygge, which projects from the shore 0.4 mile SW of Horten light structure, is 50m long on the SW side with depths up to 3m, 40m long with a depth of 4m at its head, and 110m long with a depth of 5m on the NE side which is the S berth for local ferries.

Tollbubrygge, close N of Hortensbrygge, is 120m long and has a depth of 6m alongside.

Dypvannskaia, situated 0.25 mile SW of Horten light structure, is 140m long with a depth of 7m on the SW side, 92m long on its outer side where the depth is 6m, and 160m long with depths from 8 to 9m on the NE side. Range lights are shown at the head of the basin on the NE side of this quay.

A narrow quay, close S of Horten light-structure, projects 200m from the shore and serves a tank cleaning plant. It can accommodate tankers of up to 100,000 dwt and has depths of 11m decreasing to 7m along the SW side, and of 10m decreasing to 6m along the NE side.

In 1987, this quay was used by the State Pollution Service.

Fyllingen, entered on the N side of Horten Light, is a small basin sheltered by two moles and is mainly for boats. There is a speed limit of 3 knots in Fyllingen and in the nearby canal.

Prohibited area.—Unauthorized approach is prohibited within 50m of the coast in an area around Vealos, Osteroya and Mellomoya. Passage between Vealos and Osteroya and between Mellomoya and Lovoya without stopping is however permitted.

Because of the above prohibition no description is given of the inner or Naval harbor for which special pilots are required.

Oslofjorden—West Side

4.17 Anchorages and prohibited anchorage.—**Lokeberggrunnen** (59°03'N., 10°33'E.), close NE of the NE extremity of Bastoy, has anchorage in 16 to 20m, sand and clay, in a position with the N extremity of Bastoykalven (the N part of Bastoy) in range about 286° with the small mainland community Rorestrand and with the heavily forested E side of Bastoy bearing about 184°.

Bastoybukta, the bay on the N side of Bastoy, has anchorage in 16 to 25m, sand, in a position with Bastoy NE extremity in range about 148° with **Rauoykalven** (59°15'N., 10°42'E.) and with Rorestrand bearing about 281° and open N of Bastoykalven.

Langgrunnen (59°24'N., 10°30'E.), an open roadstead between Horten and Bastoy, has anchorage for large vessels in 17 to 22m, good holding ground of sand and clay, in a position with the uncharted mainland farm buildings **Solli** (59°24'N., 10°29'E.) bearing 270° and with Moringen E side bearing 001° and open E of Fyllingen. The anchorage is much frequented, commonly used by vessels awaiting berth assignment or subject to quarantine and open to S and E winds which, when strong, can send in a considerable sea.

A prohibited anchorage area extends across Oslofjorden from a position close N of Fyllingen. Kanalhavnen is excluded from this prohibition.

Vealosflaket (59°27'N., 10°30'E.), E of the entrance to the inner harbor, has anchorage for large vessels in 13 to 15m, sand and clay, in a position close NE of the islet Vealos.

Karljohansvern (59°26'N., 10°30'E.) is a naval headquarters and shipyard with an area of control approximating the virtually landlocked Horten inner harbor. Vealosgapet, the narrow entrance channel to the harbor, leads in between the islets Vealos and Osteroya in a least charted depth of 7m. Several dangerous submerged rocks lie in the N approach to the channel.

Merchant vessels may undergo repairs at the naval shipyard but must enter under the control of a naval pilot boarded

outside the entrance to Vealosgapet. Alongside berthing facilities total 550m with depths of 8.5m.



FILTVET (DISUSED LIGHTHOUSE) (59°34.2'N., 10°37.5'E.)

Oslofjorden—West Side (Continued)

4.18 Horten to Indre Oslofjord.—Oslofjorden open to the W from Horten to the entrance to Indre Oslofjord at Filvet light; about 10 miles NNE. This broad opening is a somewhat encumbered basin which, tapering significantly in its extension, has on its N side the entrance to Dramsfjorden. Inland, the terrain is forested, quite hilly and rising with comparatively steep slopes from the water's edge. Hurumlandet, the lengthy peninsula formed between Dramsfjorden and Oslofjorden, is particularly hilly. Depths throughout the area are considerable, save for Dramsfjorden entrance where it shoals significantly before increasing again to 30m and more. Svelvikstrommen, the narrow waterway joining Dramsfjorden outer and inner parts at Ryggen, is particularly shallow and must be dredged in order to accommodate ocean-going vessels.

Currents throughout are variable and largely influenced by weather conditions. Currents in Svelvikstrommen can be of concern, particularly when heavy fresh water discharge from Dramselva, the river entering into the head of Dramsfjorden, encounters salt water driven up Oslofjorden and into the entrance to Dramsfjorden. Ice is of little concern, save in Dramsfjorden above Ryggen, where it forms overall and must be opened to shipping by icebreakers.

Pilotage.—Rødtangen, on the E side of the entrance to Dramsfjorden, is a pilot station. Vessels, subject to pilotage, board a sea pilot close E of Store Faerder and, if bound for a destination in Dramsfjorden, must board a second pilot when abeam Holtenesodden, a mainland point close N of Rødtangen. If no pilot is available from Rødtangen, the sea pilot may remain aboard until Drammen, at the head of Dramsfjorden.

4.19 Breidangen, Holmestrandsfjorden and Sandebukta are three water areas extending NNW from the vicinity of Horten. A deepwater fairway leads into Breidangen through the passage between the reef fringed islet Molen and the 11m below-water rock **Nottekrakken** (59°27'N., 10°30'E.) about 1.5 miles SSW. The fairway then continues into Holmestradfjorden between the mainland point Mulodden, 4.5 miles off Nottekrakken, and the elongated island Langoya which lies about 1 mile offshore NE of Mulodden. From Langoya Sandoybukta continues about 5.5 miles NW passing between the island **Kommersoy** (59°31'N., 10°19'E.) and the mainland.

Currents N of Molen commonly set E with a S wind and W with a N wind, however, water pouring out of Dramsfjorden can often exert a noticeable influence. Currents S of Molen

generally set E under the influence of discharge from Dramsfjorden, and then merge with current flow in the main part of Oslofjorden.

Langoya (59°30'N., 10°23'E.), the site of a limestone quarry and cement factory, has three concrete quays with depths of 5 to 6m alongside. Landing is prohibited anywhere on the island and vessels must not enter a danger zone, marked by buoys, which extends up to 0.3 mile from the island. There are warning boards posted in various parts of the island.

4.20 Close E of Molen, affords temporary anchorage in a position with the S extremity of Molen in range with the SE extremity of Langoya, and the small community of Knattvollstrand bearing about 337°; the water depth is 21 to 32m, sand.

Sandebukta (59°33'N., 10°17'E.) has several good anchorages. Holmsbukta, on the W side of the fairway near the head of the bay, has anchorage in 14m, clay, good holding ground. There is good anchorage 0.7 mile N of Holmsbukta in 10 to 30m, clay, good holding ground.

Bogebukta (59°32'N., 10°16'E.), 1.5 miles SSE of Holmsbukta, has anchorage in 20m, clay, good holding ground.

Selvikbukta (59°34'N., 10°16'E.), a small shoal water bay on the NE side of Sandebukta, is the site of a wood pulp and paper mill having a concrete quay 145m long with depths of 5.5 to 9.3m alongside. Vessels make their approach to clear several dangers that lie less than 0.25 mile S of the quay.

A sewer outfall is situated about 0.15 mile NNE of Selvikblinder. Lights in line indicate the N curve of this outfall. Another sewer outfall is situated 0.75 mile farther NW.

Erstvik (59°31'N., 10°29'E.), a small community 2 miles N of the island Molen, fronts on a deepwater cove which has anchorage for small vessels with local knowledge in 12 to 20m.

4.21 Tofte (59°33'N., 10°34'E.) (World Port Index No. 23823), along with Sagene, are small wood pulp and cellulose loading ports on the SE side of Hurumlandet. The piers at Tofte are 115m long, with depths of 8m alongside. The N pier is for the shipping of cellulose, and raw materials are unloaded at the S pier. The chimneys of the papermills are good landmarks.

A concrete quay off some conspicuous white oil tanks at Halvorshavn, 0.75 mile N of Filvet Lighthouse, is 70m long on its outer face and has a depth of 11m alongside. Tankers up to 35,000 dwt can be accommodated.

Sagene, about 1 mile SW of Tofte has a concrete quay 140m long with depths of 5.6 to 8.8m alongside, and farther W, a quay 15m long with a depth of 3m.

Anchorage.—Vessels can anchor just off the S jetty. A submarine pipeline extends 0.15 mile in a SSE direction from a position 91m W of the jetty. Caution is recommended when anchoring near the jetty.

4.22 Holmestrand (59°29'N., 10°19'E.) (World Port Index No. 23760), about 7 miles NW of Horten, is divided into a town center, situated by the sea, and several densely built up areas up in the mountain. There are two industrial facilities under the mountain, and there are a few industries up on the mountain. The harbor district is bound by a line from the mainland point Mulodden to Katholmen, an islet 4 miles NW,

then SSW to Bogen, about 0.4 mile distant. The principal quays are from 25 to 80m in length and are connected to form a common quay front; the depths vary from 4 to 6m. Sundekaiaen quay with a length of 80m and a depth of 7.3m was planned for an extension of about 15m in 1978-79. In the S part of town, there was a new quay 50m long with a depth of 8m, close N of this there is a 15m long quay with a depth of 17m.

The harbor can accommodate vessels up to 250,000 grt. Pilotage distance from sea to port is 34 nautical miles.

In making the approach to Holmestrand, care must be taken to not cross the foul ground which extends about 183m N from the N-breakwater.

Dramsfjorden (59°32'N., 10°24'E.)

4.23 Dramsfjorden extends about 15 miles NNW from its entrance between **Rodtangen** (59°32'N., 10°25'E.) and a point about 1 mile NW. At Svelvik, about 5 miles within the entrance, a headland, Ryggen, extends into the fairway and reduces the passage to less than 183m width. Drammen lies at the head of the fjord at the mouth of the Dramselva. The S part of the fjord is joined to the N part, at Ryggen, by the unique narrow waterway Svelvikstrommen. These inner and outer parts have a curiously contrasting character. Outer Dramsfjorden is relatively shallow all the way out to **Holtenesstoa** (59°33'N., 10°25'E.), with, in general, good holding ground almost everywhere. Conversely the inner section is of significant depth with relatively few good anchorages.

Ice.—As a rule, Dramsfjorden S of Ryggen is always free of ice. The upper part of the fjord is frozen every winter, but is kept open with the aid of icebreakers. With strong N winds ice which has been broken up in the inner part can be blown into Svelvikstrommen.

Tides—Currents.—Under normal conditions, the current is little noticeable in the inner part of the fjord. It is only after coming as far in as Nostodden, about 1.5 miles SE of Drammen, that the current from the river begins to make itself felt. Especially in flood stage, vessels inside must count on strong outward currents. Currents in the outer part are strongly influenced by wind conditions.

4.24 Svelvikstrommen (59°37'N., 10°25'E.) is an improved waterway formed between Ryggen and the mainland W. It joins the outer and inner parts of Dramsfjorden and permits ocean going vessels to proceed inland as far as Drammen.

Tides—Currents.—Current flow is largely influenced by weather conditions interacting with fresh water discharge from Dramselva, in that the current, in general, sets N with the rising tide and S with the falling tide. The outgoing current periodically reaches a speed of approximately 5 knots, and the inward current up to approximately 2 to 3 knots. The outward bound current tends to last longer and to create eddies along the W side of the fairway, while inbound currents have a shorter duration and reach their greatest velocity along the E side of the fairway. With strong SW winds, it is not infrequent that currents set N continuously while with strong N winds they set continuously to the S. When Dramselva is in flood

state because of melting snow or a long period of rainfall, the outbound current has reportedly reached a maximum velocity of 6 to 8 knots. Such velocity, however, has not been observed since the fairway has been deepened and straightened out.

The rise and fall of the water level in Oslofjorden, in consequence of wind conditions, influences current flow, and water level in Svelvikstrommen. Winds from the S drive in water and raise the sea level while winds from the N have the opposite effect; thus, the range between high and LW level may be as much as 2m due entirely to the wind. Tidal rise and fall is minimal, about 0.3m maximum. When the water level is rising in Oslofjorden, an inbound salt water current sets into Svelvikstrommen where it meets fresh water from Dramselva such that, particularly during an ebb tide, either a turbulence generates in the fairway or a wedge is formed with probable turbulence on the edges where salt and fresh water meet. Ship handling may be difficult under these conditions.

Svelvikstrommen is subject to silting and must be continuously dredged in order to maintain depths over a bottom width of 100m. In 1980, the least charted depth along the centerline of the channel was 9.4m.

Regulations.—Vessels, whose draft requires them to transit in the deepest part of the channel, must sound four long blasts on the whistle in good time before entering Svelvikstrommen.

All vessels intending to proceed through Svelvikstrommen should keep watch on VHF channel 16 and should inform other vessels on that channel in good time of their intended time of passage. Small vessels should keep clear of the channel until deep draft vessels have passed.

Power-driven vessels must proceed at a speed no greater than 7 knots when in transit of Svelvikstrommen between Batterioya, an islet in the S entrance to the waterway, and Blindskaer, a rock, awash, outside the N entrance.

Dredgers operating in Svelvikstrommen display on the side they are to be passed, a blue flag by day and a white light by night.

Dramsfjorden—Outer Part

4.25 Rodtangen (59°32'N., 10°25'E.) a point that is the E entrance to Dramsfjorden, is conspicuous because of a low belt of red hills; is also the site of a community of the same name. An unsheltered wooden quay 14m long with depths of 4.5m extends from Rodtangen. Onshore winds and outbound currents can be matters for concern. Vessels anchor about 200m NW of the houses in Rodtangen in 26m.

Berger, a small community on the W side of Dramsfjorden, about 1 mile NW of Rodtangen, has a quay 50m long with depths of 3.5 to 5.5m alongside.

Stoafaket (59°33'N., 10°25'E.) on the E side of the fjord 1 mile NE of Berger, has anchorage in 20 to 30m, good holding ground.

Holmsbu (59°34'N., 10°26'E.), a small community contains a harbor for small craft having depths of 3m. There are some berths with depths of 11m alongside and anchorage can be obtained with moorings to the shore.

A wooden pier 24m long with depths of 5 to 6.5m at the pier head has depths of 2 to 6m alongside.

Dramsfjorden—Inner Part

4.26 Sagbukta (59°40'N., 10°23'E.), a cove on the W side of the fjord 3 miles NNW of Ryggen, has anchorage for small vessels in a position close off its N side in depths of 12 to 15m. Vessels can moor with their stem made fast to a berthing facility at the entrance to a river entering the head of the cove.

Jordfallbukta (59°41'N., 10°22'E.), a cove about 1 mile NNW of Sagbukta, has anchorage in its N part in about 20m, soft bottom; vessels commonly moor with their stem made fast astern.

Grimsrubbukta (59°41'N., 10°26'E.), on the E side of the fjord 1.5 miles NE of Sagbukta, has anchorage at its head in less than 20m, sand and mud. Pampus, a drying patch lies in the entrance; it should be passed on the S side when entering the cove.

Jerdalsbukta and Hyggenvika, 0.65 mile NW and 2.5 miles NW, respectively, from Grimsrubbukta, have anchorage in 11 to 14m and 25m, mud, respectively.

Engesandbukta (59°44'N., 10°18'E.) on the E side of the fjord in a position opposite the entrance to Dramselva, has a pier about 35m long with a charted depth of 4m at its head and 5m along its N side.

Gullaugbukta, close NW of Engesandbukta, has a concrete quay in its SE part, that is about 53m across its face; there is a charted depth of 5.8m alongside the face. This is the site of an explosives factory.

Gilhusbukta, 1 mile WNW of Gullaugbukta, has a quay on its E side about 90m long, with a charted depth of 4.2m alongside.

Directions.—Vessels intending to proceed to the head of Dramsfjorden are recommended to adjust their arrival at Svelvikstrommen so they may transit the narrows just before HW.

Vessels enter Dramsfjorden close aboard Rodtangen, to avoid the dangers which extend about 0.4 mile SE from the W entrance point. Then vessels close to the W side to pass W of the many dangerous rocks off **Holmbusteine** (59°34'N., 10°25'E.) which are marked at their W extremity by a buoy. Then proceed to pass in mid-channel between the islets Saltskjaer, on the W side, and Bjorneskjaer, on the E side. When the light on the islet Bjorneskjaer lies on the quarter vessels direct their course to port and steer about 336° for the range in Svelvik to enter the SE end of Svelvikstrommen lower reach. When the vessel reaches a position with the light on the N extremity of the islet Batterioya abeam to port, bring this light and the light on the mainland, 0.7 mile SSW in line astern and steer through the upper reaches of the pass. It should be noted that a 9m charted depth lies on the track about 0.35 mile ENE of Batterioya N light.

When clear of Svelvikstrommen, vessels enter Dramsfjorden inner port and steer in mid-channel to destination.

4.27 Svelvik (59°37'N., 10°24'E.) (World Port Index No. 23770), a small community and paper manufacturing center has a harbor area which is under the Drammen harbor authority

and port director. The harbor is bound on the S by a line drawn across Dramsfjorden from Saltskjaer and Bjorneskjaer and on the N about 0.75 mile N of Ryggen and parallel to the S line. Power driven vessels are not to exceed 7 knots from Batterioya to Blinskjaer.

A concrete quay at the paper factory is 184m and has a depth from 3.8 to 4.5m. The public quay, which is of concrete and on piles, is 44m long with depths from 3 to 4m alongside.

Before a transit of Svelvikstrommen an ETA of the vessel must be reported and watch maintained on VHF.

Anchorage.—There is good anchorage about 0.5 mile N of Saltskjaer in depths of 7.5 to 14m, clay. This anchorage is frequently used by small vessels awaiting favorable conditions for making Svelvikstrommen.

In Svelvikbukta, N of Svelvik, small vessels can anchor in depths of 11 to 15m, gravel and clay bottom.

Dramstadbukta, the water area close N of Ryggen, has anchorage for vessels with local knowledge, in 38m, sand and mud.

Sleaviken, the coastal bight 0.75 mile NNW of Svelik, has anchorage for vessels in 10 to 30m, clay.

Drammen (59°44'N., 10°14'E.)

World Port Index No. 23780

4.28 Drammen is one of Norway's most important harbors; it stands on both sides of the mouth of Dramselva, the part on the S is known as Stomso and Tangen and the part on the N side as Bragernes and Assiden. The principal imports are oil, gasoline, coke, cinders, iron, chemicals, sugar, and vehicles, as well as diverse general cargo. The chief exports are timber, cellulose, pulp, and paper.

Holmen divides the mouth of Dramselva into two parts; Tangenrenna or Tangenlopet, the channel S of the island forms the main harbor. The harbor area includes all of Dramsfjorden inner part and extends from Svelvik harbor N limits to Drammen corporate limits, about 2.5 miles inside the entrance to Dramselva.

Ice.—Ice forms from December to March and a passage is kept open by an icebreaker. Vessels without permission should avoid breaking out of the one mandatory channel.

Tides—Currents.—Tide levels in the harbor depends on weather conditions in Oslofjorden and on the Skagerrak coast. Currents within the harbor are commonly unremarkable or variable throughout the year. The strongest ebb current is from April until July, with increased discharge from Dramselva.

Depths—Limitations.—Tangenrenna (Tangenlopet), the main ship channel to the deepwater berthing on the SW side of Holmen and on the S mainland in the area known as Tangen, leads in between the S side of Holmen and the mainland, then along the SW side of Holmen to a position about 170m downstream from the bridges. There are charted depths of 7m in Tangenrenna. The maximum draft for the main harbor is 9.2m. In all other areas there are no restrictions.

Main Harbor and Berthing

Quays	Depth	Length	Remarks
Tollbukaia	7m	110m	Coastal/local traffic. Railroad available.
Kranbrygga	7m	200m	General cargo. Railroad available.
Myrakaia	7m	155m	General cargo and bulk. Railroad available. Electric crane 23 tons for bulk cargoes.
Langbrygga	8m	255m	Paper, general cargo. Railroad available.
Tjomekaia	7m	160m	Paper. Railroad available.
Holmen South	9m	486m	General cargo and containers. Air conditioned. Railroad available.
Holmen South	9m	—	Ro-ro ramp. Cars and trailers. SE end.
Holmen South Oil Berth	7m	70m	Tankers. Size of vessel determined by water depth alongside.
Risgardkai	10m	151m	Ro-ro. Cars and trailers.
Holmen East	7m	60m	Ro-ro. Cars and trailers.
Kattegat	10m	168m	Ro-ro. Cars, trailers, and containers. 1 x 60 ton portal crane.

Pilotage.—A harbor pilot is not compulsory but can be requested through the pilot office. However, vessels over 70 grt passing under the several bridges spanning Dramselva must have a pilot.

Regulations.—All vessels arriving in the harbor shall, as soon as possible, and at least within 24 hours, report the ship to the Harbormaster Office. Regulations on reporting do not apply to government ships.

In the harbor, inside Risgaren Light, all vessels must proceed at reduced speeds of not over 3 knots.

Anchorage.—Vessels without berth assignment or subject to quarantine, anchor in a position E of Holmen in about 30m, sand and clay, good holding ground.

Indre Oslofjorden

4.29 Indre Oslofjorden, considered to lie N of the **Filtvet Light** (59°34'N., 10°37'E.) continues to Oslo, which lies at the head of the fjord, about 20 miles distant. The lower reaches are comparatively wide but narrow about 6.25 miles N of Filtvet in the vicinity of several islets. North of these islets the fjord again opens for a distance of 3 to 3.5 miles where once again a series of islets, in remarkable parallel rows across the head of the inlet, choke the navigable passage. Bonnefjorden, a

continuation of Indre Oslofjorden, extends S from Oslo for a distance of about 11 miles.

Drobaksundet, considered the most difficult passage in transit from the sea to Oslo, lies about 6 miles N of Filtvet. It is about 0.5 mile wide between the rocky patch **Drobakgrunnen** (59°40'N., 10°37'E.) and the rocks Smaskjera, to the W; it has a least charted depth of 10m in mid-channel. Sondre Kaholmen, on the W side of Drobaksundet, is joined to Smaskjera, about 0.3 mile S, and then to the mainland W by a submerged ridge with little water over it. There is an extremely narrow passage, marked by buoys, over this ridge N of Smaskjera. A fortress situated on Sondre Kaholmen is the site of occasional practice firing.

Ice.—Ice occurs in Indre Oslofjorden and can cover the entire inlet during January and February of particularly severe winters. When S winds at the same time send in drift ice from the open sea, the inlet can be largely closed to navigation by all but large vessels. Commonly however, channels to the principal harbors and ports are kept open by icebreakers. Bonnefjorden is generally icebound between January and March.

Tides—Currents.—Currents may set with the tide. Since the tide is weak and its influence minimal, current set is influenced by a strong S wind that can give currents a N set. Currents in Drobaksundet can become strong enough to create rips, while elsewhere they can set in an irregular fashion.

Pilotage.—Vessels bound for Drobak must arrange for pilots through the Oslo pilot office in accordance with existing regulations.

Regulations.—Powered vessels, when underway in Indre Oslofjorden between Filtvet light and Oslo harbor, must adjust their speed so as to forestall wave damage. Vessels are to avoid excessive wash particularly in the narrower sections of the channels. Large vessels shall also, so far as it may be possible to keep to mid-channel and observe caution, especially when passing built up areas and through narrow waterways.

Indre Oslofjorden—Entrance to Drobak

4.30 Filtvet, about 2 miles NNE of Tofte, fronts on a small cove which has a stone quay 17m in length with 4 to 5m alongside. There is anchorage in 20m about 0.2 mile N of Filtvet light, with the light bearing 207°.

Halvorshavn (59°35'N., 10°37'E.), an oil depot on the W side of the channel, has a 70m long concrete quay on its outer face and a depth of 11m alongside, lies 0.75 mile N of Filtvet Lighthouse. Tankers up to 35,000 dwt can be accommodated. Numerous submarine cables traverse the fjord both N and S of Halvorshavn.

Emmerstadbukta (59°35'N., 10°39'E.) a cove on the E side of the fjord, just over 1 mile E of Halvorshavn, has good anchorage for small vessels in 11m. Vessels make their approach S of Emmerstadbaen, awash, also an 8m below-water rock to the S. Care should be taken to avoid the sewer outfall which extends 0.3 mile W from the head of the cove.

Hvitsten (59°36'N., 10°39'E.), about 1 mile N of Emmerstadbukta, is fronted by a steeply shelving bight. It is a small, popular summer holiday resort.

Skipphellebukta (59°38'N., 10°39'E.), a small steeply shelving cove 2.25 miles N of Hvisten, has anchorage for small vessels with local knowledge in about 25m, good holding ground. The anchorage is open to S winds.

4.31 Drobak (59°40'N., 10°38'E.) (World Port Index No. 23820), about 0.3 mile inside Indre Oslofjorden, is fronted by a harbor area that extends from the islet Gylteholmen to a position about 2 miles S. Oslo University has a marine biological station in Drobak. The quays measure from 6m in length at the customs house, to 63m in length at the A.G. Johansen's quay. The depths vary from 2.5 to 4.7m. Storskjaer, SW of Drobak has anchorage off its W side in 13 to 14m sand. In Vindfangerbukta, in the N part of Drobak harbor area, Andersen's Sand Import has a good wooden quay 45m long with 4m depth alongside.

Pilotage.—Pilotage, if required, will be arranged by the pilot office at Oslo.

Anchorage.—Anchorage is permitted N of **Drobakbanken** (59°39.2'N., 10°37.9'E.) in 32m sand and mud; and also to the S of the Storwkjeret, 0.7 mile NW, on sand, clear of the prohibited area mentioned below.

A prohibited anchorage area, including the N part of Drobak harbor, defined by a line extending from the ferry landing near the community Slottet on Hurumlandet E to the biological station in Drobak, then N along the mainland to the NW extremity of the islet Husvikholmen, then WNW to Ormeleina on Haoya, then along Haoya shoreline to Gjettestrand, then SSW along Bergholmen NW side to Kinnertangen NW extremity, then along Kinnertangen to the ferry landing.

Indre Oslofjorden—West Side—Drobak to Sandvika

4.32 Saetrepollen (59°41'N., 10°32'E.), about 3 miles NW of Drobak, is a good harbor with mud and clay bottom. Engene, in the SE part of the harbor, is the site of an explosives factory, where there are two quays. On the outside of the harbor, SSE of the bight on Bjornneset, there is a concrete quay 36m long, with a depth of 10.5m. A little further S there is a wooden quay 22m long with a depth of 4.5m. The municipal quay, of wood, is 11m long with a depth of 4.5m. There is good anchorage in Saetrepollen, about midway between the S extremity of the island Torvoya, and Bjornneset, about 0.1 mile distance. A water pipeline exists across this inlet and care should be taken when anchoring. Small vessels anchor W of the S extremity of Torvoya, in about 7 to 9m.

Vessels with local knowledge, when making their approach from the N, may transit the narrow passage between **Killingholmen** (59°42'N., 10°31'E.), the N part of Torvoya, and the mainland W, in a least depth of 5m. An overhead cable, with a vertical clearance of 16m, spans the passage.

Graoysundet (59°42'N., 10°32'E.), the comparatively deepwater passage W of the island Graoy, has anchorage about 0.3 mile N of Torvoya in a depth of 35m, mud. Small vessels anchor between Torvoya and the reef fringed islet Hjelp, about 0.1 mile E, in 23m, mud.

Naersnesbukta (59°46'N., 10°30'E.), about 3 miles NNW of Graoya, a small bay encumbered with several isolated rocks,

has roomy anchorage in about 14m, about 0.2 mile from the head of the bay. Anchorage may be taken in 22 to 25m, good holding ground in a position about 0.25 mile NNE of the E entrance point of the bay. There is a shipyard on the W side of the bay with an outfitting quay 29m long with 3.5 to 4m alongside. A petroleum storage area about 0.5 mile S of the E entrance point has a wooden quay 11m long with 7m alongside. It is disused.

4.33 Slemmestad (59°47'N., 10°30'E.), about 1 mile N of Naersnesbukta, is the site of a cement factory with conspicuous chimneys and storage silos. A concrete wharf 83m long, is situated on the W side of this improved basin; there is a depth of 10m alongside this wharf. On the SE side of the basin there is a quay 150m long, with depths of 6m, for the handling of limestone. A mooring buoy is anchored in the entrance to the basin.

Bjorkas (59°48'N., 10°30'E.), close N of Slemmestad, has a concrete quay on the N side of the cove 105m long, with depths from 6 to 10m alongside.

Tajet Light is shown at the outer end of the quay.

Vessels should keep clear of a sewer outfall area, radius 180m, marked in its center by a lighted buoy, moored 0.45 mile ENE of the quay.

Hagabukta (59°48'N., 10°30'E.), 0.75 mile N of Bjorkas, has anchorage about 0.2 mile NNW of the mainland point Ellnestangen, in 10 to 13m, clay. Foul ground with a least depth of 1.6m exists close N of the anchorage.

4.34 Vollenbukta (59°49'N., 10°29'E.), about 0.35 mile NW of Hagabukta, is a deepwater bay which has anchorage in 15m, clay, off the SE side. There are three small quays with depths of 3.2m, 5m, and 7.2m, near the head of the bay. This bay is also the site of a repair works which mainly has facilities for the repair of steel hulls.

Blakstadbukta (59°50'N., 10°30'E.), is an elongated water area formed by the mainland on the NW side, and by a series of rocks and islets extending in a SW direction from Bjorkoya on the SW side. Small vessels, with local knowledge, can anchor well inside this water area in a depth of 13m. Vessels approaching from the SE, steer for the narrow entrance between the dangers extending SW from Bjorkoya and the islet Krokholmen. Seer for the NE extremity of Krokholmen on a heading of about 322° and pass between Kojaberget and Vestre Bjorkoyskjaer, then through the narrows and proceed to destination.

4.35 Holmenfjorden (59°51'N., 10°31'E.), the next inlet N of Blakstadbukta, is a deepwater area which has Holmen at its head. It is formed on the E by numerous islands, rocks, and islets, and in the other areas by the mainland. There is a small boat harbor and shops at Holmen, where there is a municipal quay 8m long, with a depth of 2.6 to 5m. There is anchorage for small vessels off Holmen in about 14m, but care should be taken to stay clear of the sewer pipeline between Holmen and Nesoya to the NE. The principal entrance to Holmenfjorden lies between the rocky patch Bjorkoygrunnen, off the N end of Bjorkoya and submerged dangers off-lying the islet group Rodskjera.

Leangbukta (59°50'N., 10°29'E.) is entered from Holmenfjorden; it extends about 1.25 miles SW to its head where there is a small manufacturing center. The center is fronted by a concrete quay 29m long with 4.4 to 6.1m. Vessels may anchor about 0.65 mile off the head of the bay in 17m or further in, N of the foul ground in 16m, clay.

4.36 Sandvika (59°53'N., 10°32'E.), about 2.5 miles NNE of Holmenfjorden, is a small administrative and factory center at the entrance to the shallow river Sandvikselva. It is fronted by a series of islands and submerged dangers, which lie in parallel rows, and are transited by several intricate channels. Sandviksbukta lies E of Sandvika; a suspension bridge with a vertical clearance of 2.7m, spans the bay between the island Kalvoya and the E entrance point to Sandvikselva.

In Sandvika, there is a good concrete quay 30m long with a 7m depth alongside.

Anchorage is available throughout the many fairways leading to Sandvika, where depth and swinging room are suitable.



Photo courtesy of Donald and Diana Carter
DAMMAN (DISUSED LIGHTHOUSE)

Viernbukta (59°52'N., 10°34'E.), the water area between the islands Bronnoya and Ostoya has anchorage in 19m, clay and mud in a position with Ihleholmen N extremity bearing about 091° and open S of Ostoya SW extremity and with Hareholmen, which lies close E of Bronnoya, SW extremity in range about 182° with Hoyerholmen summit. Close N of the anchorage, the bottom becomes rocky.

Halskilen (59°52'N., 10°32'E.), a shoal water narrow inlet indenting the NE side of the island Nesoya, has anchorage for small vessels in 6.9m.

Sandvika has anchorage near its central part in 10.5m.

4.37 Lysakerfjorden (59°54'N., 10°39'E.), close W of Oslo, is entered 1.5 miles NE of Snaroya; it is a comparatively clear and roomy deepwater bay. It lies between 2 peninsulas to the N of Nesodden, formed between Bygdoy, on the E and Fornebulandet on the W. This fjord provides access to an oil depot at **Lysaker** (59°54.7'N., 10°38.6'E.) and to another at Rolfstangen. The NE continuation is the shoal water inlet Bestunkilen. Lysaker, an urban community and chemical processing center lies on the W side of the head of the bay and on the W bank of river Lysakerelva. Fornebulandet is the site of the international air facility for Oslo. The area E of the airport is a seaplane harbor with operations extending into Lysakerfjorden.

Three submarine pipelines extend SSW, from a position on shore about 0.21 mile NE of Lysakerelva, to a position W of Lysakerflua. A mooring buoy marks the SW extremity of the pipeline area, where fishing and anchoring are prohibited, and lights in range form each side.

Depths—Limitations.—There are oil installations and a pipeline near **Sagflisodden** (59°53.7'N., 10°38.1'E.). At Lysaker there is an angled concrete jetty about 183m S of the mouth of Lysakerselva, fronting another oil installation.

The largest berth on the N side of **Rolfstangen** (59°53.5'N., 10°38.0'E.), having a length of 40m and depths of 7.3 to 9.3m alongside, is used to supply an oil depot for Oslo Airport.

The largest berth at Lysaker, on the W side of the river by an oil depot, has a length of 89m and depths of 9.8 to 10.5m alongside. It is reported that tankers up to 35,000 dwt can be accommodated. There are four other berths at Lysaker.

There is also a concrete quay at Lysaker, 169m long with depths from 2.6 to 6.0m alongside.

Oslo marine airport extends into Lysakerfjorden in two parts. The inner part, in the SW part of Lysakerfjorden, lying W of a line joining Rolvsflua buoy with Lagmannsholmen, is prohibited to all vessels at all times. The outer part, occupying almost all of Lysakerfjorden, is a seaplane operating area with controlled access during the seaplane flying season. In general, large vessels may freely transit the operating area, provided they exercise due caution and, if hailed by a patrol boat, follow such orders and instructions that may be given.

Indre Oslofjorden—East Side—Drobak to Bonnefjorden

4.38 Haoya (59°42'N., 10°34'E.), a large island that rises to a height of 229m, lies in the middle of Indre Oslofjorden, close NW of Drobak. Foul ground lies in the middle of the E channel and Haoygrunnen, with a least charted ground. There is good

anchorage, for large vessels, W of Haoygrunnen in 25 to 30m, clay, with the NE extremity of Haoya with the summit of Aspond in range about 011°. To approach the anchorage from the S, steer close along the E side of Haoya, and pass W of the foul ground and the dangers of Haoygrunnen keeping the points of land Bruresteinen and Transtadodden in range about 140° astern.

Digerudgrunnen (59°43'N., 10°35'E.), a coastal bank marked by a light, has anchorage close off its S side, in 17m. The anchorage, for small vessels, is taken with the N extremity of Haoya in range about 288° with Nordre Sundbyholmen and with the NE extremity of Aspond in range 339° with the SW extremity of Langara. A 4m below-water rock lies close N of the anchorage.

Hallangspollen (59°41'N., 10°37'E.), an inlet close N of Drobak, has anchorage for small vessels in a depth of 26m, mud, in a position close N of the islet Gylteholmen, which lies close within the entrance.

Grisebubukta (59°44'N., 10°35'E.), a bight in the mainland E of the N extremity of Aspond, has anchorage for vessels in 15m, sand. The floor of the bight is level, but it falls off abruptly to greater depths.

Fagerstrand (59°44'N., 10°35'E.), a small community close N of Grisebubukta, may be identified by the fuel storage tanks in the vicinity. It is the site of a stone pier which is available for the bunkering of large vessels. The outer face of the pier is 200m long with depths from 8.9 to 12m off its W side and 170m long with depths from 6.9 to 10m off its E side. Tankers up to 35,000 dwt can be accommodated. A concrete quay, situated 183m N of it, is 65m long and has a depth of 10.5m alongside.

Lagoy (59°44'N., 10°34'E.), an islet close W of Fagerstrand, has anchorage for small vessels in a cove on its SE side in 17m, mud. A concrete quay 12m long with 4.2m alongside lies at the head of the cove.

Granerudstoa (59°47'N., 10°36'E.), a coastal petroleum storage area and bunkering station about 7 miles N of Drobak is fronted by three berthing facilities. The facility farthest S consists of a pier 156m long, with least depths of 10m alongside the outer face, and 7m alongside the inner face. A privately maintained range of daymarks and lights lead to the pier where vessels commonly berth with the bow upstream. Close N of the bunkering station there is a pier 40m long where vessels of up to 500 grt can moor. The pier farthest N is 85m long with a least depth of 11.3m alongside the outerface and 5 to 11m alongside the inner face.



STEILENE (DISUSED LIGHTHOUSE) (59°48.9'N., 10°36.1'E)

4.39 Steilene (59°49'N., 10°36'E.) (World Port Index No. 23790) an islet group about 2.25 miles N of Granerudstoa, is the site of a former bunkering station now in use as an off-loading storage area for the refinery at Stagenstangen. The passage between the islets and the mainland to the E is clear

and has a least charted depth of 28m. Submarine cables and an underwater pipeline are laid across this passage.

Landsteilene, the islet farthest E, has a berthing facility on its E side with a total length of 115m with depths of 2.1 to 14m. Storsteilene, the largest islet of the group, has anchorage close off its NE extremity in 26m, clay.

Ildjernet (59°51'N., 10°39'E.) is a small island off-lying the mainland coast 1.75 miles NNE of Steilene. Sutarbukta, the water area S of the island, has anchorage in about 21m, clay, with the beacon on Gasungane bearing about 267° over the SW extremity of Ildjernet. Ildjernsbukta, the landlocked water area between the island and the mainland, is fouled by numerous rocks. Vessels approaching from the S may pass on either side of the islet Sutarholmen, according to draft. The passage on the E side of the islet has a least charted depth of 6m; that on the W side, has a least charted depth of 4.5m. Kavringen, an islet in the N part of Ildjernsbukta, has a wooden bunkering quay on its SW side 14m long with depths of 5 to 6m alongside.

Kavringen Light is shown from an iron perch on a submerged rock 183m W of that islet, which lies 0.15 mile E of the NE end of Ildjernet.

Nesoddtangen (59°52'N., 10°39'E.), marked by a light, is the N extremity of a peninsula that forms the E side of Indre Oslofjorden and the W side of Bonnefjorden. On its W side, there is a good concrete quay 40m long with 3.3 to 5.8m alongside.

Bunnefjorden (59°49'N., 10°44'E.), the SSE continuation of the head of Oslofjorden, has a length of about 9 miles from its entrance E of Nesoddtangen. The inlet narrows at its head, spanned by an overhead cable with a vertical clearance of 34m crosses the fjord in 59°44.4'N. This fjord is of comparatively little importance to oceangoing shipping except for that portion lying within Oslo harbor limits. The inlet is deep and steep-to and anchorages are few, and generally unsuitable for large vessels. However, large vessels may anchor at the head, off the community of the only harbor at **Neset** (59°44'N., 10°44'E.), in a depth of 16m, mud.

The speed limit is 5 knots on the Nesodden side within 150m of the shore. Ice usually closes Bunnefjorden during the months of January to March.

There are several small berths in places on both sides of the fjord with depths of 3 to 4m alongside which allows daily communication by sea with Oslo.

Small vessels, with local knowledge may anchor in **Blylagbukta** (59°46.7'N., 10°43.0'E.), **Solbukta** (59°46'N., 10°43'E.), and **Asebukta** (59°45.4'N., 10°43.0'E.), good holding ground, mud

The area is clear of a submarine cable which crosses the fjord close N of the anchorage.

Oslo (59°54'N., 10°45'E.)

World Port Index No. 23810

4.40 Oslo, the capital as well as the cultural and chief railway center of Norway, lies on the NE side of the head of Oslofjorden. The city spreads out over the greater part of the slopes rising gently inland to heavily forested background

hills. Oslo with its surrounding metropolitan area represents the most significant demographic concentration within the entire country.

An extensive harbor district comprises much of the offshore area and extends S well into Bonnefjorden. Oslo harbor district extends SSE from the mouth of the Lysakerelva for a distance of about 4 miles to the SW extremity of the islet Sondre Skjerholmen, then further SE for about 2 miles to the mouth of the river Gjersjoelva.

Tides—Currents

The tidal range in the harbor is negligible, approximately 0.3m at springs. Meteorological conditions have the greatest influence on the height of the water, with a N wind, LW, and with a S wind, HW. The highest tide observed was 2.9m above normal, and the lowest water observed was 1.1m below the normal.

The current in the harbor is very weak, and has little particular significance for navigation. It has made itself felt from Nesoddtangen NE, into Bonnefjorden, and further in between the islands in the E harbor. Among the islands it mixes with the water in Akerselva and flows W past Vippetangen, toward Filipstad and Frognerkilen and out between Bygdoy and Nakkholmen.



APPROACHES TO OSLO

Depths—Limitations

Oslo harbor is sheltered by a number of islands in the S part. However, they are so situated that they present no problem for navigation. Approach to the harbor is made through three channels.

The W channel, between Bygdoy and Nakkholmen, has a width of 200m between the lights on Dyna and Koppernaglen; it has a depth of 19m. However, there is a rock with a depth of 8.6m located 0.3 mile SW of the light on Dyna; it is marked by a buoy. Rocks which cover 9.3m and 9.4m lie about 174m ENE, and about 128m WNW, respectively, from the above rock. Vessels with deep draft must navigate with great caution in this area. This channel is open and well arranged, it demands only slight changes in course.

The Central Channel, between Lindoy and Grasholmen, Hovedoya and Bleikoya, is more narrow, with several shallows in the fairway, and should not be used by vessels with drafts greater than 5.5 to 5.8m. There are a multitude of berths for cargo as well as ro-ro berths; the total overall length of quays is 6.75 miles. Berthing instructions are given from the Harbor Master. Vessels are to send their ETA to the Harbor Master's Office 1 hour prior to arrival, through Oslo Havne Radio on VHF channel 12.

Container traffic is handled at Filipstad and Ormsund.

Berth	Depth	Utilization
BEKKELAGET		
Bekkelags Quay N	6m	Ro-ro, molasses
Bekkelags Quay S	7.3-9m	General cargo, containers
Kneppeskjaer Pier	6.4-6.8m	Ro-ro, containers
Ormsund Quay	9.3-11m	Ro-ro, containers, lo-lo
BISPEVIKA		
Bispe Quay	4-4.5m	Coastal traffic
Paulsen Quay	3-5m	Local traffic
Soreng Pier	6-9m	Ro-ro, containers
Soreng ro-ro ramp	6m	Ro-ro
BJORVIKA		
Bjorvika	6m	General cargo
Kran Quay	5m	General cargo
Lang Quay	6-7m	General cargo, ro-ro
Pale Quay	3.5m	general cargo
Pale Quay	6m	Ro-ro
Revier Quay	10m	Ro-ro, general cargo
FILIPSTAD		
Brannskjaer Pier	2m	Sand barges
Filipstad Quay	8.5-11m	Ro-ro, containers, lo-lo, general cargo
Hjortnes Quay W	8.5-10m	Ro-ro, tourist
Tjuvholmen	7-8m	Ro-ro, coastal
GRONLIA		
Gronlia Quay	6-8m	Ro-ro, iron, general cargo
Loeng Quay	7m	Ro-ro, general cargo
KONGSHAVN		
Kongshavn Quay N	7m	Cement
Kongshavn Quay S	7m	Building materials

Berth	Depth	Utilization
PIPERVIKA		
Akershus	3.6-4.4m	Coastal
Akershus N	2-5.5m	Coastal
Akershus S	4.7-10.5m	Coastal, tourist, Navy
Raadhusbrygge 1-4	3.5-5m	Coastal, local traffic
SJURSOYA		
Oil Pier	10-13m	
Sjursoy Quay N	8-10m	Ro-ro, fertilizer, cement, salt, grain
Sjursoy Quay S	6.3-6.9m	Oil, fuel
Sjursoy Quay E	4.7m	
VIPPETANGEN		
Pier No. 2	6.1-7.6m	Ro-ro, tourist
Pier No. 3	6-8.3m	Sugar, grain
Vippetangen Quay	7-9m	General cargo, tourist

Aspect

Trefoldighets Kirke (59°55'N., 10°45'E.) has a large green dome over its center, surmounted by a small thin steeple, and two smaller steeped towers at its SW and NW comers. Var Frelsers Kirke, about 0.25 mile SSE of Trefoldighets Kirke, has a conspicuous rectangular tower surmounted by a very high steeple. A navigation school, in the form of a large, four-sided, multistoried building, stands on a scrub covered hill about 1.25 miles SSE of Trefoldighets Kirke; a tower rises from each corner of the building.

Pilotage

For details on the series of passages involving pilotage from open sea to Oslo, see paragraphs 3.5, 3.6, 4.4, and 4.31.

Regulations

Regulations are in effect for the control of speed by power driven vessels such that, in general throughout the harbor, speed should never become so great as to endanger shoreside facilities or other vessels. In particular, it should not exceed 10 knots within any of the waterways leading through the many islets lying N of a parallel passing close off Husebergoy SW extremity. It should also not exceed 5 knots within Frognerkilen, Pipervika, and Bjorvika as well as in between the W extremity of Sjursoya and Raudskjer, near the N extremity of Malmoy and places notified by the Harbor Authority.

Anchorage

Anchorage, for vessels without berth assignment, is available outside the inner harbor, wherever depths are sufficient and the position is clear of inbound and outbound shipping. The holding ground, in general, is sand, clay or mud. Karantenehavna, for vessels subject to quarantine, has good anchorage in about 28m, mud, in a position close S of Bleikoya. Pipervika, within the inner harbor, has anchorage for

moderate-sized vessels, in about 24m, mud, in a position close off the berthing facility Vippetangbrygge.

Oslofjorden (continued)—East Side—Stromtangen to Moss

4.41 Oslofjorden E side, for a distance of 25 miles between **Stromtangen** (59°09'N., 10°50'E.) and Indre Oslofjorden, is fringed by numerous islands, islets and foul ground bordering the mainland. The inner channel on this section of coast leads through Ytreleia, E of Sondre and Nordre Misingen, then through Rauerfjord and Krokstadlera, then continues NNW.

Sondre Misingen (59°10'N., 10°43'E.) and Nordre Misingen are two islets lying about 4 miles WNW of the light on Stromtangen. Tyta, a rocky area with a least charted depth of 4m, lies about 1 mile SSE of Sondre Misingen and Skjolden, with a charted depth of 10m, lies 0.5 miles SW of the S extremity of Tyta.

Ytreleia (59°11'N., 10°45'E.), a comparatively broad, deep channel, leads E of Sondre and Nordre Misingen into Rauoyfjorden. The E side of Ytreleia is fringed by a concentration of islets and foul ground extending up to 1.25 miles from the mainland. Narrow winding channels lead to several small vessel anchorages in this area. The W side of Ytreleia, E of Sondre and Nordre Misingen, is encumbered by the many rocks, islets, and submerged dangers of Misingskjaerene. This channel offers no difficulties in clear weather.

Brotta (59°09'N., 10°48'E.), a drying reef marked on its N end by a beacon, lies about 1 mile W of Stromtangen Light. Skarekrakk, a 5m rock marked by a buoy, lies about 0.3 mile farther W. Tollefskrakk, a 10m patch, lies about 1 mile farther NW.

Garnholme Light (59°12'N., 10°46'E.) is shown on the S side of Nordre Garnholme, the N and largest of several islets in the S entrance of Hankoysund. A six-sided monument, with a tilted anchor on top, is located close N of Garnholme Light. Sondre Garnholme, an islet about 0.34 mile SSE of the light, is bordered close SW by Nebba, a 7m patch.

Piggrunnane, awash and marked at their N end by two iron perches, lie about 0.5 mile NW of the monument on Nordre Garnholme. Hankoykrakken, a 4m patch marked by a buoy, lies about 0.5 mile farther NW. Gaseskjaerbaen, a 3m patch marked by a buoy, lies about 0.25 mile N of Piggrunnane.

4.42 Hankoysund (59°12'N., 10°48'E.) is a narrow sound formed between the mainland and the island of Hankoy. The sound is navigable by small vessels with local knowledge and drafts not exceeding 5m. There is a speed limit of 5 knots in the channel.

Anchorage.—The best anchorage in Hankoysund is found in 9 to 14m, good holding ground, off Rorvik, a settlement on the E side of the sound, about 1.25 miles NE of Nordre Garnholme.

Care is necessary to avoid a submarine cable which exists 1 mile NW of Rorvik. There are several small quays on both sides of Hankosundet.

Slevikkilen, about 1 mile E of Nordre Garnholme, affords anchorage for small vessels in 9 to 13m. Local knowledge is necessary for entering.

Ellinggardskilen, at the N end of Hanksund, is navigable only by small vessels with local knowledge. In winter, the inner half of the inlet is usually icebound. The inlet has good anchorage in depths of 7 to 24m through most of its length, but is restricted by its narrow width.

4.43 Rauoyfjorden (59°14'N., 10°43'E.) is entered between Rauortangen, the S point of the island of Rauoy, and **Flateguri** (59°13'N., 10°44'E.), a small islet, marked by a light. A clear fairway, about 0.34 mile in width and with a least charted depth of 17m leads N through the fjord; however, there are nearby shoal patches on both sides.

Unauthorized approach is prohibited within a line joining Kjelsbergangen and the SE point of Rauoy and within 50m of the coast in an area around the rest of Rauoy and Rauoykalven. Anchoring and fishing are prohibited in Rauoyfjorden within an area bounded S by a line between Flateguri and Rauoytangen. Its N limit is a line extending E from **Rauoykalven** (59°15'N., 10°42'E.) to the mainland, the E limit extends S to Smaustangen and continues SSE to Flateguri.

Hausen, a 10m patch, lies about 1 mile SSE of Rauortangen. Storegrunn, a reef extending about 0.7 mile SE of Rauortangen, is marked S and E by buoys.

Engelsviken Light (59°15'N., 10°44'E.) is shown on the seaward end of the pier at Engelsviken, a small inlet. Larshausen, with a least depth of 8m, lies on the E side of Rauoyfjord, about 0.5 mile SW of Engelsviken Light. Skaelrevet, a 5m rock, lies about 0.34 mile W of the same light.

Veslekalv Light is shown on an awash rock close off the N extremity of Rauoy. Jensehausen, with a depth of 9m, lies about 1 mile NE of the above light, and in the N approach to Rauoyfjord.

4.44 Sondre Sletter (59°17'N., 10°41'E.), Mellem Sletter and Store Sletter front the entrance of Krokstadleira, an extensive roadstead. The islands of Eloy (Eloen) and Kollen lie farther NNW. An inner channel continues NNW from Rauoyfjorden and leads between the E side of the above mentioned islands and the mainland to the vicinity of Larkollen. The least charted depth in the fairway of 15m is found NE of Store Sletter, lesser depths are near the channel.

Svartebaerne, a small group of awash rocks, is the outermost of the dangers extending about 1 mile SSE of Sondre Sletter. Blinda, a rock with a charted depth of 3m, lies 0.25 mile N of Svartebaerne. Nordre Bogrund, with a least depth of 6m, and Hella with a least depth of 10m, lie about 0.6 mile, and 1 mile, respectively, S of Sondre Sletter. Aletitten, a 7m rock, lies on the E side of the inner channel fairway, about 0.5 mile E of Mellem Sletter.

Shoal water, marked on the outer end by a buoy, extends about 0.34 mile N of Store Sletter.

Larkollen Light is shown on Hvitesbaen, a rock located on the E side of the inner channel fairway, and about 0.34 mile NE of the E extremity of Eloy. A submarine cable is laid NNE from the light-structure to the mainland. Larkollen is a village and summer resort on the mainland E of the island of Kollen.

Anchorage.—Large vessels can anchor in about 20m, mud, about 0.5 mile SSW of Larkollen Light, between Store Sletter and Eloy. Such vessels can also anchor in 13 to 24m, good holding ground, in the bight on the E side of Eloy, S of Kollen.

Skjaeløysund (59°16'N., 10°44'E.), entered between Engelsvikoy and Skjaeloy, offers anchorage in 9.1m to vessels with local knowledge. The holding ground is not very good, and a hawser for securing to the shore should be kept ready. The S and N parts of Skjaeløysund are shallow. A small pier is located at Lervik, a settlement on the E shore. Vessels approaching Skjaeløysund should avoid the dangers in the N end of Rauoyfjorden.

Krokstadleira (59°17'N., 10°43'E.), a broad bay, is divided in its N part into two arms by Avenoy (Aven). Kurefjord, the W, and larger arm, is very foul; Krokstadfjord, the E arm, has a narrow channel for small vessels leading to Krokstad, near its head.

Rodskjaer, an islet about 2 miles NNE of Veslekalv, has foul ground extending about 183m S, and a reef, with some awash rocks extending about 0.25 mile N.

Saltholmen, a small peninsula, lies about 1 mile NE of Rodskjaer, on the E side of Krokstadleira. Svenskehausen, a 3m patch, lies about 0.5 mile NNE of Saltholmen.

The best approach to Krokstadleira from Oslofjorden is between Veslekalv and Svartebaerne, taking care to avoid the shoal patches lying SW and W of Veslekalv. Rodskjaer can be passed on either side and a course set for the desired anchorage.

Anchorage.—The best anchorage in Krokstadleira is in 13 to 24m, NW of Saltholmen. Vessels anchoring near the peninsula should bring up as close as possible to obtain the maximum shelter from SW winds, which cause a considerable sea.

Protected anchorage for vessels with local knowledge can be found, in depths of about 7m, W and N of the islet Taralden, in the SW part of Kurefjord.

Aerefjorden (Arefjorden) (59°22'N., 10°40'E.), a small inlet, is entered E of Aerefjordtangen, the S extremity of a narrow peninsula. Aerefjordbaen, with a depth of 1m and marked by an iron perch, lies about 0.2 mile S of Aerefjordtangen. Anchorage, for small vessels only, is available near the head of the inlet.

Revlingen Light (59°24'N., 10°38'E.) is shown on the NW point of Revlingen, an islet in the approach to Moss. Revlingenkalven, a smaller islet, lies close S of Revlingen. An 8m patch lies about 0.25 mile S of the latter islet. A spar buoy, moored about 0.2 mile NW of Revlingen Light, marks the outer edge of shoal water extending from that side of the islet.

Anchorage in 18.3m is available for small vessels close off the NE side of Revlingen.

Moss (59°26'N., 10°40'E.)

World Port Index No. 23830

4.45 The port of Moss, consisting of two harbors connected by a canal, is located on the E side of Oslofjorden, about 26 miles N of the Fjord entrance. The S harbor is at the head of Verlebukta; the N harbor is at the head of Mossesundet.



Photo courtesy of Moss-Shipping

CARGO DOCKS AT THE PORT OF MOSS

Moss is a well-developed industrial town and port. In the area are paper mills, pulp mills, sawmills, a shipyard, engineering works, textile mills, canneries, a cellulose factory, and a glass works. At the NE end of the town, a small river flows into Mossesundet from the series of lakes E of the town.

The Horten-Moss ferry crosses the fjord along the parallel of 59°24.8'N.

The port stands across and around the isthmus joining Jeloya to the mainland. The S part of the harbor is in Verlebukta and the N part is in Mossesundet.

The S part of the harbor is approached from the main channel of Oslofjorden, in the vicinity of 59°24'N, 10°37'E, passing S of Jeloya, then entered through Verlebukta.

The N part of the harbor is approached from the main channel of Oslofjorden, in position 59°32.5'N, 10°37.0'E, passing N of Jeloya, then entered through Mossesundet.

Winds—Weather.—The N harbor is well-sheltered from all winds, but in the S harbor, during SW gales, the working of cargo is liable to be interrupted.

Ice.—During severe winters, ice forms in both harbors, but the channels are normally kept open by icebreakers.

Tides—Currents.—The tidal range is normally about 0.3m, but during SW gales the water level may be raised as much as 2m. The flow in Mossekanalen changes with the tide and with weather conditions.

Strong tidal currents are reported in Mossekanalen, setting S during the rising tide (beginning about 15 minutes after HW at Bergen), and setting N during the falling tide (beginning about 6 hours before HW at Bergen). There is usually little

movement but, during stormy weather, the flow can set at more than 1 knot in either direction, dependent on the wind which is generally SW in summer and N in winter.

During SW winds, a maximum current of 4 knots setting N through the canal has been experienced.

Depths—Limitations.—Moss Harbor contains two harbor areas, one N and one S of the town, connected by Mossekanalen which has strict limitations. However, both areas can be approached independently. Mossesundet has two main port areas, the S area at Moss, in the vicinity of the canal, and the N at Kambo, 2.75 miles NNE of the canal.

The direction of buoyage is from S to N in Vaerlebrygga, Mossekanalen, and in Mossesundet; but reverse in the entry to Mossesundet, it is from N to S.

In the approach to Moss through Verlebukta, there is a rock which covers 4.5m, located about 0.25 mile E of Reiertangen; a rock which covers 7m, lies 0.25 mile SSE of the above rock.

A speed limit of 4 knots is imposed between **Reiertangen** (59°25'N., 10°38'E.) and Mossekanalen; then through the canal and N in Mossesundet to **Rosnestangen** (59°26.8'N., 10°39.6'E.).

A safe approach can be made with a draft of 9m to the berths in Verlebukta. Mossesundet, provides a deep water approach to Moss in which charted depths of more than 20m can be maintained to a number of the major berths.

The largest vessel handled in Verlebukta is 20,000 dwt with a draft of 9.5m and in Mossesundet is 28,000 dwt with a draft of 11m.

There are 3 berths in the S harbor. The W side is 160m with a depth alongside of 6.4m. The E side, N part is 110m, with a depth of 7.3m. The E side, S part is 150m, with a depth of 10m. Berths in the S part of the harbor will accommodate ro-ro vessels.

There is a container terminal, consisting of a concrete quay 34m in length with breasting dolphins off each end. The depth alongside is 10.8m.

Kambo Oil Terminal is 121m long with a depth of 8.5m alongside. Vessels up to 28,000 dwt can be accommodated.

Aspect.—Conspicuous objects seen when approaching Moss are a church standing about 0.5 mile NE of the S end of the canal; the chimney about 0.5 mile NNE of the church and the chimneys W of the canal bridge.

Pilotage.—Pilotage is compulsory. Pilots board at Ferder Pilot Station.

Anchorage.—There is an anchorage in Mossesundet in 26m, mud. The anchorage N of Mosseelva is in 30 to 47m, mud.

In Verlebukta, E of a line from the light on **Revlingen** (59°24'N., 10°38'E.) to the light on Værlébrygga, 2 miles NNE, is to be used as an anchorage for vessels approaching Moss from the S and have not been assigned a berth or anchorage. In Mossesundet, in the bay to the W of a line from **Kippenes Light** (59°29'N., 10°40'E.) to Kjellandsviktangen, 1 miles SSW, is to be used as an anchorage for vessels approaching Moss from the N and have not been assigned a berth or anchorage.

Caution.—Dumping grounds for explosives lie in the following areas:

1. Within the fairway, in the vicinity of 59°17'N, 10°34'E.
2. In the SW approach to Moss, centered on 59°23.0'N, 10°36.5'E.

A wreck, with a least depth of 8m is situated about 0.6 mile NE of Reiertangen.

The bridge over the canal is permanently closed. It has a vertical clearance of 4.5m, with a depth of 4.0m.

Moss to Mossesundet—West Side of Jeloya

4.46 Guldholmen Light (59°26'N., 10°35'E.) is shown on the W side of Guldholmen, about 1 mile NNW of the SW extremity of Jeloya. Guldholmkrakken, with a least depth of 5m, lies about 1 mile WSW of Guldholmen, and is marked on its NW end by a buoy. It is covered by the green sector of Mefjordbaen Light bearing more than 179°.

Sauetogrunnen, with a least depth of 5m and which breaks in a heavy sea, lies about 0.25 mile off the SW side of Jeloya, and about 0.5 mile S of Guldholmen.

Tromvikbukten, Rambergbukten, and Nesbukten indent the W side of Jeloya. Bevoya lies close off the N extremity of Jeloya. Bileoy, a small islet lies about 0.25 mile SW of Bevoya.

Rambergkrakken, an 11m patch, lies about 1 mile NNW of Nebbeberget, the S entrance point of Rambergbukten. Langgrunden, with a least depth of 5m and marked by buoys, lies about 0.5 mile SW of Nestangen, the S entrance point of Nesbukten. Neskrakken, with a least depth about 0.5m and marked by buoys, lies about 0.5 mile farther N. A 7m patch lies about 183m N of Neskrakken.

Bilekrakken, with its least depth of 5m at its NW end marked by a buoy, lies about 1 mile W and WSW of Bileoy.

Lindholmgrunnen, a 7m patch marked by a buoy, lies about 1 mile WNW of the N end of Bileoy. Storholmgrunnen, with a least depth of 11m, lies about 0.3 mile farther N.

Bevoykollen, with a depth of less than 1.8m and marked by an iron perch, lies about 1 mile NNW of Bevoya. A 4m rocky patch lies about 183m S of Bevoykollen. Asbjørngrunnen, with a least depth of 12m, lies about 0.34 mile WSW of Bevoykollen. About 0.5 mile NE of Asbjørngrunnen, is a least depth of 12m.

Sauholmane Light (59°31'N., 10°40'E.) is shown on the SW islet of Sauholmane, which lies on the E side of the Mossesundet entrance and in the Sonsbukten entrance, about 1 mile E of Bevoya.

4.47 Mossesundet (59°28'N., 10°40'E.), formed between the mainland and the E side of Jeloya, is entered between Bevoya and Sauholmane, about 1 mile E. Gjova, an islet, lies on the W side of the sound about 0.4 mile S of Sauholmane. Mossesundet forms the N approach to Moss.

Kongshavn (59°29.8'N., 10°40.0'E.) affords anchorage for coasters in position 0.6 mile NNW of Kippenes in a depth of 20m, clay. The bottom slopes steeply E and is rocky to the N.

The bay N of **Kjellandsviktangen** (59°28'N., 10°40'E.) affords good anchorage 0.5 mile N of the point and 275m from the shore in depths of 12 to 20m, clay and sand. This is a laying-up area (mothball fleet area) for large tankers. At the S end of Mossesundet, off the town of Moss, anchorage is recommended off the W shore, 370m N of the canal entrance; and off the E shore at a distance of 0.6 mile NNE of the canal entrance

Spetalsgrunnane (59°30'N., 10°41'E.) consists of four detached rocks with a least depth of 2.3m on the W side of the fairway about 0.6 mile SSE of Gjova. There is a N to S passage between these rocks with a least depth of 20m, but the deeper channel lies E of the four rocks.

A light is shown on Kippenes point, about 0.3 mile SSW of Spetalgrunnane. A rock with a depth of 9m lies on the E side of the fairway, about 0.2 mile E of the light.

Kjellandsviktangen, a promontory on Jeloya, lies about 1.25 miles SSW of the light on Kippenes; foul ground extends 0.25 mile SSW from the S end of the promontory.

4.48 Kambo (59°29'N., 10°41'E.) (World Port Index No. 23829) or Mossesundet at Kambo, lies on the E side of Mossesundet, about 0.7 mile SSE of Kippenes. The deepest berth at Kambo with a length of 61m and depths of 14.4 to 17.7m alongside is at Norsk Gulf, an oil terminal, which can accommodate vessels of 20 000 tons. Larger vessels can be anchored off and secured by the stern. The longest berth, with a length of 144m and depths of 9.7 to 11.7m alongside, is at Felleskjøpet. There are two other berths and a mooring buoy.

Anchorage.—Anchorage can be taken in 15 to 20m off the quay. Pilotage is compulsory for the oil berth.

Caution.—Approach Mossesundet from Oslofjorden by passing N of Asbjørngrunnen and Bevoykollen. Steer through the sound in mid-channel, taking care to avoid the W dangers

of Spetalsgrunnane. Kippenes Light bearing 183° leads close E of the 3m rock. Deep water is available close E of the E rocks of Spetalsgrunnane.

4.49 Mossesundet to Indre Oslofjorden.—From Mossesundet the coast trends about 3.25 miles NNW to the S entrance to Indre Oslofjorden. The coast is indented by Sonsbukta and Kjovangbukta. There are no charted dangers other than those previously discussed.

Son (59°31'N., 10°41'E.) (World Port Index No. 23828), located on the E side of Sonsbukta, is a small town and summer resort. With a secure fishing port on the NE side of the entrance to Mossesundet. It contains a large trading area with good communications. There is a speed limit of 4 knots in the harbor.

Anchorage.—Anchorage can be obtained in depths of 18 to 25m, with good holding ground, in the middle of the bay. Mooring rings are available along the NW side of the harbor. The largest berth is the Old Service Boat Quay, with a length of 46m and depths of 2.6 to 3.1m alongside. There are 2 marinas with full supporting facilities including fuel and water.

Middelgrunnen, two rocky heads with depths of 4m and 5m, is in the entrance of Sonsbukta, between the SW islet of Sauholmane and Sonstangen, about 0.5 mile N. A 7.8m rocky head lies close E of these rocky heads. Two rocks with depths of 3 and 4.5m and marked NW by a buoy, extend about 0.25 mile N of the SW islet of Sauholmane.

Ballastbaen, with a depth of 3m lies about 91m S of Maritangen, a point on the N shore of the harbor, about 0.2 mile E of Sonstangen.

Caution.—Approaching Son from NW, after passing Sonstangen, steer in between that point and Middelgrunnen, with Pjaken, the S house at Son, bearing about 096° until Bevoysund, the passage between Beloya and Jeloya, is closed on a bearing of about 238°. Then alter course N to the anchorage. Vessels approaching Son from the S, pass W of Sauholmane and then enter Sonsbukta as directed above.

The coast between Sonstangen and Brenntangen, about 3 miles NNW, is steep-to and broken by several coves. **Kjovangbukta** (59°32'N., 10°40'E.), about 1 mile N of Sonstangen, affords good anchorage to small vessels in 9 to 18m. Shoal water extends a short distance offshore on the E and N sides of this cove. Care is necessary to avoid a submarine cable which exists between the S entrance point of Kjovangbukta and Hulvik, 0.5 mile N. There is a small wooden quay with a depth of 5m alongside.

Oslofjorden—Southeast Environs

4.50 Hvaler, at the SE entrance of Oslofjorden, is the name given to the large group of islands lying between Saekken at the Norway-Sweden border and Stromtangen, about 12.5 miles NW. The principal islands of this group, from SE, are Herfol, Sondre Sandoy, Nordre Sandoy, Kirkoy, Asmaloya, Akeroya, Spjaeroy, Vesteroy, and Papperoy. The approaches to the ports of Halden, Fredrikstad, and Sarpsborg lie through the main channels among the islands of Hvaler.

Fronting Hvaler are numerous rocks, awash and submerged, extending SE from Torbjornskjaer. From Oslofjorden the

principal outer approach to these ports is N of Torbjornskjaer. Then a vessel bound for Halden can pass SSW of Hvaler and through Saekken, Singlefjorden, and Svinesund. A vessel bound for Fredrikstad or Sarpsborg can proceed through any of the channels among the islands of Hvaler and then into Osterelv. Fredrikstad and Sarpsborg can also be approached by passing either N or S of Sostrene and Struten, and then S of Stromtangen, through Leira, and into Vesterelv.

The channels can also be approached from the S through Swedish waters, as described in Sector 5.

Pilotage.—Pilotage is compulsory for all vessels. Pilot stations are off Store Faerder, Nordkoster, and Herfol. Several restricted areas lie within these waters.

Off-lying Islands and Dangers

4.51 Torbjornskjaer (59°00'N., 10°47'E.), about 8 miles ESE of Store Faerder, is a small islet on the E side of the entrance of Oslofjorden. The islet with its stone light structure is conspicuous. Torbjornskjaer Lighthouse (low tower on granite building 18m in height) is conspicuous and, when approached from SW, can be identified from a distance.

Skjaerekkrakene, with a least depth of 4.9m and marked on their N end by a buoy, lie between 0.5 mile and 1 mile NW of Torbjornskjaer; there are depths of less than 1.8m between. Vessels approaching Hvaler from the W should pass N of these dangers.

Aspect.—**Koster** (58°54'N., 11°01'E.), **Faerder Lighthouse** (59°02'N., 10°32'E.), **Store Faerder** (59°04'N., 10°32'E.) a bare, dark gray island, with a deep cleft on its S edge which is visible from E and W, 2 miles N of Faerder Light, can be easily identified.

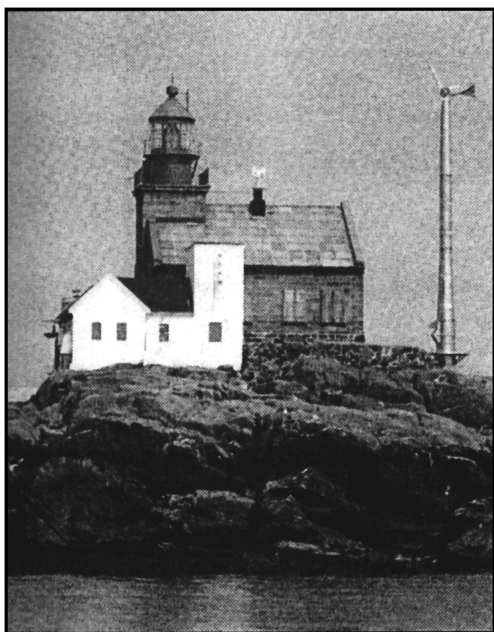
The islets off the S side are lower by comparison. **Hollenderbaen Light** (59°10'N., 10°38'E.) stands on a concrete column on an elevation of 18.6m. A radar beacon is fitted at the light.

Fulehuk disused lighthouse (59°11'N., 10°36'E.) is situated on a white wooden building with a 15m high tower which stands on Nordre Fulehukskjaer.

Fulehuk Light with an elevation of 10m, stands 40m N of the disused light. **Veten** (59°10'N., 10°26'E.) which is the highest point on Notteroy, is conspicuous from the E.

Between Torbjornskjaer and the boundary of Norway with Sweden, about 4.5 miles SSE, there are a few islets and many shoal patches with hundreds of awash and submerged rocks. Several narrow channels lead in among the dangers; all channels are usable only in good weather with local knowledge and will not be described. Vessels from the S bound for the ports of Halden, Fredrikstad, or Sarpsborg will normally use the channel between Grisbadarna and Kosteroarna. This channel is in Swedish waters and is described in Sector 5.

The best of the above mentioned channels in Norwegian waters follows the buoys marking the approximate boundary between Norwegian and Swedish waters. Heia, an islet about 4 miles SE of Torbjornskjaer Light, is marked by a black beacon surmounted by a cross. A mast stands close N of the beacon. A black beacon on its SW side stands on Kuskjaer, a rock about midway between Heia and Torbjornskjaer. Buoys mark some of the dangers near the several channels in the area.



TORBJORNSKJÆR LIGHT SEEN FROM SW

In heavy weather, the sea breaks over all the shoal ground between Torbjornskjaer and Heia.

4.52 Trestenene Light (59°01'N., 10°54'E.) marks a group of rocks on the SW side of Hvaler about 4 miles ENE of Torbjornskjaer Light. This light indicates the main approach to Loperen from Oslofjorden.

Tisler is a group of islets and rocks lying about 3 miles SSE of Trestenene Light. A beacon stands on Alne, the farthest W islet of the group, and another beacon marks the farthest E islet of Svartskjaerene, at the SE end of Tisler. A signal mast stands on the largest islet of the group.

Near Tisler the current may be very strong, especially during unsettled weather of long duration; its direction depends on the wind.



STRUTEN LIGHT

Struten (59°07'N., 10°45'E.), an islet marked by a light, lies on the E side of Oslofjorden about 7 miles NNW of Torbjornskjaer and marks the W limit of dangers off Hvaler. Foul ground extends nearly 0.5 mile NNW from Struten and is marked on its N extremity by a beacon, which stands close to a disused lighthouse.

Sostrene, consisting of the islands of Sondre Soster and Nordre Soster, lies on a bank of foul ground from 0.5 to 1.5

miles SE of Struten Light. Both islands are dark, have well defined outlines, and make good landmarks for vessels proceeding up Oslofjorden.

Strutskrakken, two patches with a least depth of 3.5m each marked by a buoy, lie about 1.5 miles NNE of Struten.

Seikrakken, a 3.5m patch marked by a buoy, lies about 0.75 mile SSE of the S point of Sondre Soster. It can be passed on either side.

4.53 Lera.—Stromtangen Light (59°09'N., 10°50'E.) is shown from a wooden house on the S end of Stromtangen, an islet close to the mainland 3.25 miles NE of Struten. A fog signal is sounded from the light. It marks the SW and W approaches to Lera and is generally in use by coasters proceeding to Vesterelv.

Lera is a bay entered S of Stromtangen Light, and can be approached by passing either S and E of Sostrene or N of Struten. Vesterelva is entered from the N part of Lera, and from the SE part of the bay, a narrow, tortuous channel leads to the S approach to Osterelv, the E channel to Fredrikstad, passing S of Krakeroy and between that island and Kjekoy. The latter channel is available only for small vessels with local knowledge.

Tides—Currents.—In the channel between Sostrene and Vesteroy, the S current is the stronger, especially when floods in Glama cause a strong current to set through Vesterelva, at which times there may be turbulence in the channel.

On the N side of the entrance of Lera there is turbulence caused by the strong outgoing current from Vesterelva and the backwash from the steep coast.

In Lera, the current is usually influenced by the wind, but most frequently, it sets SW and W because of the outflow from Vesterelva.

Caution.—Gjyren (59°06'N., 10°48'E.) is a rock lying awash about 0.25 mile NE of the S extremity of Sondre Soster and is marked by a perch.

Papperhavn Light is shown from a wooden hut on Lyngholmen, situated 1.5 miles ENE of Sondre Soster.

Skorstenene is several rocky patches lying from about 0.5 mile to 1 mile W and WNW of Papperhavn Light, on the E side of the channel.

The E most patch of Skorstenene, with a depth of 2.7m lies about 0.5 mile of Papperhavn Light and is marked by a buoy.

Osgrunnen, marked by an iron perch, lies awash about 1 mile NNW of Papperhavn Light. Several submerged rocks lie between Skorstenene and Osgrunnen.

Hummerkrakken, with a least depth of 2.7m, lies from about 1 to 1.25 miles NNW of Papperhavn Light and is marked on its NW side by a buoy.

Halvor, a reef of awash and submerged rocks, lies from about 1 to 1.25 miles N of Papperhavn Light and is marked at its S end by an iron perch.

Skarekrakken (59°09'N., 10°48'E.), a 5m patch marked by a buoy, lies on the N side of the W approach to Lera about 1 mile W of Stromtangen Light. Brotta, a drying reef marked on its N



ASMALOY AND VIKERHAVN SEEN FROM SW

side by a black beacon, lies about 0.75 mile W of Stromtangen Light. Submerged rocks, with a least depth of 8.7m, lie between Skarekrakken and Brotta.

Caution.—Pilleren (59°08'N., 10°51'E.), a 7m patch, lies about 1.25 miles SSE of Stromtangen Light. An 11.9m and 10.1m patch lie about 0.15 mile W and E, respectively, of Pilleren.

Torgautgrunnen, a 6m rocky patch marked by a buoy, lies about 1 mile ESE of Stromtangen Light, and close N of Torgautgrunnen is a 7m patch. Several other rocky patches lie between Stromtangen Light and Stangeskjaer, on the E side of Lera.

Directions.—A vessel approaching Lera from the S, between Sostrene and Vesteroy, should be careful to avoid Seilrakken by passing to the N or S.

After passing Seikrakken a vessel should bring the NE extremity of Nordkoster, bearing about 150°, astern. Then open S of Vesteroy, which leads through the fairway between the NE side of Sostrene and the W side of Vesteroy.

Pilotage.—Pilotage is compulsory for Lera and its approaches. Sea pilots board vessels off Faerder on the W side of Oslofjorden.

Anchorage.—Anchorage can be obtained by large vessels near the middle of Lera 1.25 miles ENE of Stromtangen in depths of from 25 to 27m.

Fredrikstad—South Approach

4.54 Loperen (59°02'N., 10°58'E.), the main channel to Fredrikstad, is entered from S of Hvaler between the islands of Kirkoy and Asmaloy and with a least charted fairway depth of 10m is capable of accommodating ocean-going vessels to the deep-water facilities in Osterelv. The fairway is narrow and steep-to with strong cross currents and should not be attempted without a pilot.

Fugletangskjaer Light, shown on a rock close off the SE extremity of Asmaloy, marks the W side of the entrance to Loperen, and Habutangen Light, 0.75 mile to the N on the E coast of Asmaloy, marks the approach to the channel. A submarine cable runs from the light NNW to the shore.

Caution.—**Kyrre** (59°01'N., 10°59'E.) a 10m patch, and Vidgrunnen, a 3.5m patch, lie in the S approach to Loperen in positions about 1.5 miles SSE and 0.675 mile SSW, respectively, of Fugletangskjaer Light.

Vidgrunnen Light is shown from a structure situated on Vidgrunnen, a rock with a depth of 2m or less over it 0.5 mile ESE of Vikertanger.

Galtene, a group of awash and submerged rocks marked at its S extremity by a metal perch, lie on the E side of the S entrance of Loperen and about 0.675 mile ESE of Fugletangskjaer Light.

Vikertangflu, parts of which are awash, extends nearly 0.25 mile S from **Vikertangen** (59°02'N., 10°57'E.) and is marked at its S extremity by an iron perch. A rock with a depth of 8.7m lies close S of Vikertangflu.

A reef extends nearly 0.25 mile SSE from Fugletangen, the SE extremity of Asmaloy. Fugletangskjaer Light is located on the E side of this reef.

Kvernskjaer, an islet lying in the middle of the S entrance of Loperen, is fringed by a reef which extends about 183m S from it. Kvernskjaergrunnen, with a least depth of 2.7m, lies about 0.2 mile N of Kvrnskjaer and is marked on its W side by a lighted buoy. Submarine cables run from the light W to the shore, and across Loperen close N of Kvemskjaergrunnen.

Hestholmgrunnen, marked by an iron perch, lies partly awash in a position about 0.3 mile E of Habutangen Light.

Store Kraka is an islet lying about 0.5 mile NNE of Habutangen Light. Sondre Krakeflu lies awash close S of Store Kraka and is marked by an iron perch. Nordre Krakeflu, also marked by an iron perch, lies at the N extremity of a reef extending nearly 0.2 mile N from Store Kraka.

Lubbegrunden Light is situated on the NW side of a shoal with a least depth of 6m over it, situated 0.2 mile E of Dodvikpynten light-structure. A submarine cable runs from the light W to the shore.

Kirkeskjaer, an islet from which a reef extends about 183m W, lies nearly 0.5 mile ENE of Dodvikpynten Light. The W extremity of the reef is marked by a buoy.

Kuskjaer, the reef on which stands Kuskjaer Light, is marked at its S end by a buoy.

Loperen Light (59°05'N., 10°58'E.) is shown on the E side of Loperen, an island close to the NE end of Asmaloy. An overhead cable with a vertical clearance of 10m spans the channel between the islands. An overhead cable with a clearance of 10m spans the channel between the W side of Loperen and Ingerholm, 2.25 miles N, and between Kua close W of Loperen and Ingerholm.

Submarine cables are laid across the channel between Loperen and Loperungen Light-structures, and the NW end of Kirkoy, and also along the W side of Brattholmane.

Another submarine cable is laid NW between the NW side of Loperen and Moren.

Morengrunnen lies awash about 0.34 mile N of the island of Loperen and is marked by an iron perch.

Mokkelassene, a number of awash and submerged rocks, lies from about 0.5 mile to 1 mile N of Loperungen. A beacon marks Sore Mokkelass, the S most awash rock. The W edge of this shoal is marked by two buoys.

A rock with a depth of less than 1.5m lies about 0.5 mile WNW of the beacon on Sore Mokkelass, and a 3.7m patch marked by a lighted buoy lies close off this rock.

Fugleskjaerene (59°07'N., 10°59'E.) two islets on the E side of the channel, lie surrounded by foul ground about 1.75 miles N of Loperungen.

A lighted buoy marks Vestre Fugleskjaergrunnen, a mid-channel shoal about 0.34 mile W of Fugleskjaerene; vessels can pass E or W of this shoal, but vessels with local knowledge may pass between the lighted buoy and Gaseskjaer, a small islet about 0.25 mile WNW.

4.55 Belgen (59°08'N., 10°58'E.), at the entrance to Osterelva, is marked by a light. Risholmgrunnen, awash, and Belgenbaen, with a least depth of 6.9m, lie about 0.75 mile and 0.5 mile, respectively, S of Belgen. Each of these dangers is marked by a buoy.

Tides—Currents.—In Loperen there is usually an outgoing flow which consists of an upper layer of fresh water that may attain a rate of one knot during floods when the water discharged from Glarna is discolored. There is sometimes, an incoming current with strong onshore winds although the flow may vary at different depths.

Pilotage.—Pilotage is compulsory for the waters of Loperen. Vessels approaching Fredrikstad by this route should board a pilot at the main pilot station off Faerder on the W side of Oslofjorden.

Vessels approaching from the S can board a Norwegian pilot SE of Herfol.

Anchorage.—There is good anchorage for moderate-sized vessels with local knowledge on the E side of Loperen, about 0.75 mile NE of Habutangen light structure and S of the islets Filletassen and Kjerringholmen, in depths from 16.5 to 20m, with good holding ground. Small vessels with local knowledge can obtain anchorage W of the N end of Kjerringholmen, about 0.5 mile ESE of Dodvikpynten light structure, in depths of 16.5 to 22m.

Asmalsundet and Skjelsbusundet are narrow channels leading from seaward to **Osterelva** (59°11'N., 10°58'E.) and Fredrikstad. Asmalsundet is formed between the islands of

Asmaloy, on the E, and Spjaeroy to the W. A bridge with an overhead clearance of 10m spans the channel near the N end of Asmaloy; a cable with a vertical clearance of 11m spans the channel close N of the bridge.

Skjelsbusundet (59°05'N., 10°55'E.) is formed between Spjaeroy, on the E, and the island Vesteroy on the W. Three overhead cables with a overhead clearance of 17m span the channel; a bridge with an overhead clearance of 17m crosses the channel near its N end.

Both of the channels and their approaches are encumbered with numerous dangers and are available only for small vessels with local knowledge.

Fredrikstad (59°12'N., 10°57'E.)

World Port Index No. 23840

4.56 Fredrikstad stands on both banks of Glama where the river divides at **Isegran** (59°12'N., 10°57'E.), the NE end of Krakeroy, into Osterelva, the E outlet and Vesterelva, the W outlet. This is a typical industrial town, with shipyards, food-processing plants, and oil refineries.

Depths—Limitations.—Osterelva, the E approach channel leads along the E side of Krakeroy from Belgen. This passage is well marked and has a least charted depth of 10.6m in the fairway.

Vesterelva, the W approach channel leads N from Lera in the vicinity of Kraka; the deepest channel is E of Kraka. This channel will accommodate vessels with a maximum draft of 5.2m. In Vesterelva regulations require vessels to proceed at slow speed while in transit.

In Osterelva vessels with a maximum draft of 11m can be accommodated and in Vesterelva the alongside depths are 5.5 to 7.6m. The tanker berth has a maximum available draft of 10.4m, brakish water.

On the E side of the N part of Osterelva, within 1 mile S of Isegran, there are quays 1,000m in length with depths from 8 to 11m alongside. There are ro-ro berths at the S end of these quays.

The quays in Vesterelva, E of **Korsepynten** (59°13'N., 10°56'E.), have depths from 3 to 4m alongside.

On the NW side of Glama, the railway quay beneath the bridge is 155m in length and has a depth of 5m alongside. The customs quay, situated 183m NE of Isegran, is 92m in length with a depth of 5m alongside.

A tanker berth exists at Qera Quay, capable of accommodating vessels with drafts up to 10.3m.

There are many other quays within the harbor area of Fredrikstad. These include quays for handling containers and with discharging facilities for copra and grain in bulk.

Vessels up to 200m in length, 29m beam, and 10.4m draft can be accommodated.

The ports of Fredrikstad and Sarpsborg have combined to form an area known as Borg Harbor (Borg Havnevesen).

The bridge connecting Fredrikstad and Krakeroy has a vertical clearance of 9.5m, when closed. The navigational channel through the bridge, to indicate submarine cable running between the bridge piers, has a clear width of 47m. Vessels proceeding with the current have the right of way through the bridge. Vessels passing through the bridge should

proceed at their minimum safe speed. Vessels may communicate with the bridge via R/T VHF.

The bridge opens for pleasure traffic at 0600, 0900, 1200, 1800, and 2100 local time. The bridge is closed to all waterway traffic Monday through Friday from 0630-0730 and 1515-1630 local time. Between 2100-0600 local time the bridge will be opened on request.

Pilotage.—Pilotage is compulsory. Pilots board, as follows:

1. In the vicinity of Faerder Light.
2. Between Tresteinene Light and Vidgrund Light.
3. About 0.5 mile SE of Herfor. Only a few hours notice is needed. Sea pilots are exchanged for relief pilots at Alshus and Huth, and conduct vessels to berths at Fredrikstad.

Regulations.—There is a speed limit of 5 knots in the port.

Signals.—Traffic signals for the bridge to Krakeroy are shown from the signal mast on the E side of Isegran for vessels approaching from Osterelva, and from the signal mast on the E side of the bridge for vessels approaching from Vesterelva.

Vessels approaching from Osterelva sound one long blast followed by one short blast.

Vessels approaching from Vesterelva sound one long blast followed by two short blasts.

If the bridge cannot be opened it will sound a series of short blasts (at least five).

One red light indicates that the bridge is closed.

One yellow light indicates that the bridge is ready for opening.

One green light indicates that the bridge is open.

Two red lights, vertically disposed, indicate that the bridge cannot be opened.

Storm signals are displayed by day only from a signal mast on the E side of **Osterelva** (59°11'N., 10°58'E.), and at Huth in Vesterelva.

Anchorage.—The quarantine berth for Osterelva is E of Belgen, and for Vesterelva in Lera. Smaller vessels can anchor W of Huth.

Caution.—Firing occasionally takes place from the batteries near Fredrikstad. Local notice is usually given.

Vessels approaching the ferry route should exercise caution and proceed at the slowest possible speed. This area lies in Osterelva, about 0.25 mile below Isegran. One long blast on the whistle must be given in the approach to the area, and again before the route is passed.

Vessels proceeding from Vesterelva to Osterelva must keep on the starboard side of the channel.

Vessels carrying chlorine or a cargo equally or more dangerous are not allowed to navigate in Vesterelva.

Glama (59°13'N., 10°58'E.), extends ENE from the bifurcation at Fredrikstad. There are no charted dangers between the 10m lines in the river for a distance of about 5.5 miles. Vessels with a draft of 7.3m can reach the quays at Alvim, the W suburb of Sarpsborg, and a draft of 6.1m can reach Mellos, an E suburb of Sarpsborg.

The channel is well marked and is constantly being made safe for navigation by dredging.

A bridge, with a vertical clearance of 39.5m, spans Glama close NE of Fredrikstad. Another bridge, with a vertical clearance of 29m, spans the river close W of Mellos.

4.57 Sarpsborg (59°16'N., 11°06'E.) (World Port Index No. 23835) stands on the Glama about 6 miles above Fredrikstad. The berthing facilities for seagoing vessels are in the SW part of Sarpsborg and along the N bank of the river for a distance of about 2 miles WSW.

At Alvum, on the N side of Glama 0.5 mile ENE of Vestenodden, there are quays 540m in length with depths of 6 to 8m alongside. There is a ro-ro ramp at the end of this quay, capable of handling vessels up to 6,000 grt, with a depth alongside of 7.3m.

Quays at Mellos, on the SE side of Sandesund, have a total length of 929m and depths alongside up to 7m.

On the S side of the river quays within 0.4 mile SW of Hustangen are 500m in length with a depth of 7m or more alongside.

There are several other smaller quays at Saipsborg.

Tides—Currents.—Tides are regular but the range is only 0.3m at springs. In general, the current does not present any difficulties, but at flood it can be bothersome up to Mellos. During times of highest tides, it is recommended that vessels call at Alvum. It is only under exceptional circumstances that ice presents obstacles to shipping.

Pilotage.—is compulsory for all vessels of 100 grt and over. Pilots are requested from Faerder or Herfol pilot stations via Tiome radio. The harbor office can be contacted by VHF.

Vessels can anchor anywhere in Glama, clear of the submarine cables, while awaiting a berth.

Halden—South Approach

4.58 Sekken (58°59'N., 11°04'E.) is a channel which lies between Herfol, Sondre Sandoy, and Nordre Sandoy, on the W, and the Swedish coast and several islands extending about 2.25 miles SSW there-from, on the E. From its S entrance, which lies between Herfol and Nord-Hallso (Sector 5), it trends in a general NNE direction for about 7 miles to Singlefjorden. The fairway of this channel, being deep and nearly straight and having few dangers, is preferable to channels among the islands of Hvaler for vessels bound for Halden. The boundary between Norwegian and Swedish waters extends through Sekken approximately in the middle of the fairway. Several beacons, which are not intended for navigation, stand on the Swedish shore of Sekken and mark the approximate limits of this line.

Vessels can approach Sekken from S of Hvaler or from seaward along the marked Norwegian-Swedish boundary, both previously described, or by the channel S of Grisbadarna or from Koster Fjorden, the latter two described in Sector 5.

Aspect.—Nord-Hallso and its light structure form the best mark in the approach when within the outer dangers. **Halle Vagnaren** (59°02'N., 11°09'E.), a conspicuous hill 122m high on the coast of Sweden about 4.5 miles NNE of Nord-Hallso, is also an excellent mark.

A beacon, consisting of a 30m black tower with two white bands, stands about 0.25 mile NNW of the S extremity of Herfol and another beacon, consisting of a tower painted with black and white vertical stripes, stands on the largest islet of Gylteholmane, a group lying near the SE side of Herfol.

Sekkefluene (58°59'N., 11°04'E.), some awash and submerged rocks, lies up to 0.25 mile SSW of the beacon on Gylteholmane. The S extremity of these rocks is marked by a light. Hollaendergrunnen, a 1.5m patch marked by a buoy, lies about 0.3 mile ENE of the beacon on Gylteholmane.

Glan Light is shown on an islet lying on the NW side of Sekken and close E of the E extremity of Herfol. A black and white beacon stands on Lille Fisbuskjaer, a rock lying nearly 0.25 mile SE of Glan Light.

Tjurholmen and the surrounding islands, on the E side of Sekken, are described in Sector 5.

A small white beacon standing above a white patch is located on the Swedish coast in a position nearly 1 mile NE of Tjurholmen, and about 1.5 miles ENE of this beacon is a large white beacon. These beacons in range 062° lead SE of Sekkefluene.

Reiertangen Light (59°01'N., 11°07'E.) is shown on the E side of Sondre Sandoy in a position nearly 2 miles NE of Glan Light. A submarine cable extends ESE across the fjord from a position 165m N of Reiertangen Light.

Ostre Rodskjaer is an islet lying near the middle of the fairway and about 2 miles NNE of Reiertangen Light. A reef, parts of which are awash, extends about 0.2 mile N from Ostre Rodskjaer. A 3.7m patch, close W of the W extremity of this reef, is marked by a perch.

Kattholmen, with a light on its E side, lies about 1 mile NE of Ostre Rodskjaer and nearly 0.5 mile off the Swedish coast. Two small awash rocks named Lofod lie about 0.25 mile NNW of Kattholmen. A shoal, with a depth of 5.5m, lies about 0.34 mile N of Kattholmen.

Shoals with depths of 4.2 and 5.9m lie 0.5 mile NW and N, respectively, of Kattholmen Light-structure.

Tides—Currents.—The current in Sekken, under normal weather conditions, sets outward. It is never strong enough to be hazardous.

4.59 Directions.—Approaching from SW and having passed Kosteroama, steer for the entrance of Sekken with Vagnaren bearing 035°. Pass in mid-channel between the mainland and Sondre Sandoy, and then keep close to the Swedish coast, which is steep-to and clear of dangers, to the entrance of Svinesund. If approaching from the main channel of Oslofjorden by passing between Tisler and Hvaler, clear Sekkefluene with the aid of the range beacons on the Swedish coast NE of **Tjurholmen** (58°59'N., 11°06'E.), and then proceed as directed for vessels approaching from the SW.

Pilotage.—Pilotage for Sekken is compulsory. The Norwegian pilot station is located on the island of Herfol with pilots boarding just to the SE. Vessels approaching from the SW board pilots off Nordkoster and vessels approaching from Oslofjorden can board pilots off Faerder.

Anchorage.—**Toftebukten** (59°00'N., 11°04'E.), on the E side of Herfol, affords anchorage to small vessels in 8.2 to 11.9m, good holding ground, about 0.2 mile NNW of Glan Light. A white wooden beacon marks a small awash rock lying on the N side of this anchorage. Vessels approaching the anchorage from the S can pass on either side of Lille Fisbuskjaer and Glan Light.

Small vessels with local knowledge can anchor in 16m near the E side of Nordre Sandoy in a position about 0.5 mile SSE of the N extremity of that island. Smarodskjaer, a rock, awash, lies on the E side of this anchorage.

4.60 Singlefjorden (59°05'N., 11°10'E.), the area W of the entrance of Svinesund, is a N continuation of Sekken. Channels connecting Singlefjorden with the S approach to Fredrikstad and Sarpsborg are described in the latter part of this sector.

Haslaufu Light (59°06'N., 11°11'E.) is shown on a rock of the same name lying about 3 miles N of Kattholmen Light.

Hykkelen Light is shown on an awash rock lying close to the E side of Singlefjorden in a position about 1 mile NNE of Haslaufu Light. A submarine pipeline is laid between these two lights.

Grisen (59°06'N., 11°11'E.), with a least depth of 0.9m, lies about 0.7 mile SE of Haslaufu Light and is marked on its W side by a perch. A number of other dangers, some of which are marked by perches, lie off the E shore of Singlefjorden between the entrance of Svinesund and Hykkelen Light.

Jonsgrunn, an 8.7m patch, lies about 0.4 mile SSW of Haslaufu Light.

Anchorage.—Svalerodkilen (59°06'N., 10°13'E.), an inlet entered about 2 miles NE of Kattholmen Light, affords anchorage in 16.5m about 1 mile within its entrance.

Vessels can anchor in Skjebergkilen, an inlet at the N end of Singlefjorden in 7.8 to 15.1m about 4.25 miles N of Haslaufu Light. This anchorage should be approached by passing E and N of Kjerringholmen, an islet on the W side of Skjebergkilen. Shoal water extends about 183m from the N side of Kjerringholmen and a non-dangerous wreck fouls the bottom about 0.25 mile N of the islet.

The fairways leading to these anchorages are free from dangers.

A measured distance of 1 mile is located in Skjebergkilen and is indicated by a pair of range beacons on the W side of the entrance and another pair of beacons on Kjerringholmen. The running course is 007°-187°.

4.61 Svinesund (59°05'N., 11°15'E.) is a narrow channel connecting Singlefjorden with Idefjorden. From its entrance, which lies about 2 miles NE of Kattholmen Light, it extends in a general ENE direction for about 4.5 miles to its junction with Idefjorden; the E part is also known as Ringdalsfjorden. A fixed bridge with a vertical clearance of 58m over a width of 50m crosses Svinesund about 2 miles within its W entrance.

The Norway-Sweden boundary extends through Svinesund approximately in mid-channel, but Knivsoyholmen, near the junction with Idefjorden, is entirely in Norwegian territory. Beacons indicating the direction of the boundary stand in various places on the shore but have no navigational significance.

The fairway of Svinesund is available for vessels drawing up to 7.6m.

The speed of vessels in Svinesund must not exceed 7 knots between the N end of Hummerholm and the bridge.

Ice.—The channel is usually kept open throughout the year with the help of icebreakers.

Tides—Currents.—In fine weather, the incoming and outgoing tidal currents are fairly regular and attain a rate of 3 to 4 knots. The incoming current commences at LW and the outgoing current commences at HW. Large vessels anchor outside the sound and await slack water to transit the fairway.

Aspect.—Sponvikskansen Light is shown on the N side of the entrance of Svinesund in a position about 2.75 miles NE of Katten Light.

Hummerholmgrunn, a 5.5m patch marked on its N side by a buoy, lies about 91m S of Sponvikskansen Light. A 4m patch lies close N of Seleterodde, a point on the Swedish shore about 0.675 mile ENE of the same light.

Two buoys mark the N side of the channel immediately W of the bridge across Svinesund. The bridge is marked by lights on each side of the navigational span.

Knivsoyholmen, an island at the E end of Svinesund, narrows the channel to less than 0.2 mile and lights mark both sides of the fairway.

Anchorage.—Saltbackenshamn, an inlet on the S side of the entrance of Svinesund, affords anchorage to small vessels with local knowledge in depths of up to 25m, sand and mud.

There are several other anchorages for small vessels along the shores of Svinesund. Mooring rings are available in some places.

Halden (59°07'N., 11°23'E.)

World Port Index No. 23850

4.62 The port of Halden is situated at the E end of Svinesund in the area formed with the junction of Idefjorden. Brattoya, in the W approach, gives protection to the outer harbor, and Sauoya, with a buoyed channel on its E side forms the W side of the inner harbor. Vessels can approach the outer harbor either N or S of Brattoya.

The harbor area includes all Norwegian waters in Svinesund E of Sponvikskansen Light and also in Ringdalsfjorden and in Idefjorden.

Ice.—Ice forms in Svinesund and Halden every winter but usually the channels and harbor berths are kept open by icebreakers.

Tides—Currents.—Generally tides do not rise over 0.3m at Halden. Currents in the harbor are not as strong as in Svinesund where they attain a rate of 2 to 4 knots and ocean-going vessels should only enter the channel at slack water.

Depths—Limitations.—The least depth in the approaches to Halden is controlled by Svinesund. The outer harbor has depths of 10 to 20m over most of the area between Brattoya and Sauoya. Smaller vessels can use the channel N of Brattoya which has a least fairway depth of 7.2m. The berths in the outer harbor have depths of 7.5 to 9m alongside and are easily accessible.

The channel to the inner harbor is buoyed and has a fairway depth of about 6.6m but silting is a problem. The berths in the inner harbor have depths of 3.5 to 7.7m alongside.

Halden can accommodate tankers of 20,000 dwt, and other vessels up to 170m in length, 21m in beam and 7.6m draft.

Pilotage.—Pilotage is compulsory. Normal pilotage distance from sea is 26 nautical miles. VHF channels 16 and 12 are used. Pilot will embark near Sponvika.

Anchorage.—Vessels waiting for slack water in Svinesund anchor in Singlefjorden. Within the harbor of Halden the best anchorage is E of Brattoy in depths of 13 to 16m, mud and sand.

Directions.—Skysskafferen Light, S of the harbor, leads between Brattoy and the mainland to the SW. Two lights in line 087° indicate the edge of the shallow water on the N side of the channel N of Brattoy; a buoy marks the shallow depths on the S side.

Two lights in range 024° lead into the inner harbor; buoys mark the shallow water on each side of the range line except in the N part of the entrance where the deeper water is E of the line and the lights must be opened to secure it.

4.63 Idefjorden (59°03'N., 11°25'E.) extends about 9 miles SSE from the E end of Svinesund. It is nearly free of dangers but the water shoals to 3m about 1 mile from its head. The boundary between Norway and Sweden is approximately in the center of Idefjorden.

Skysskaffern (59°06'N., 11°23'E.), marked by a light, is located about 0.7 mile S of Sauoya, on the E side of the fjord. A rock, with a least depth of 7.4m, lies in the fairway about 0.55 mile WNW of the light.

A white cairn, 2.5m in height, stands on the SW point of Halleholmen which lies in the Swedish side of the fairway about 1.5 miles SSE of Skysskaffern. Foul ground, with a depth of 2.4m at its extremity, extends about 91m E from the islet.

Halle (59°05'N., 11°22'E.), a loading place on shore W of Halleholm, has a concrete quay 25m in length with a depth of 8m alongside. It has a wooden extension of 20m, where the depth alongside is 6m. In 1979, both were in poor condition. Vessels can anchor off Halle in 27m, good holding ground.

Kuskjera, an islet, lies on the E side of the fairway in a position about 2 miles SSE of Halleholm.

Ystehedekilen, an inlet entered ENE of Kuskjaer, affords anchorage to small vessels in 11 to 12.8m about 0.5 mile within its entrance. A loading place in Ystehedekilen has a wharf 47.2m long with depths of 4.9 to 7m alongside. Ystehedekilen is iced up for three months every winter.

Floberg Light is shown on the E side of Idefjorden in a position about 2.5 miles SSE of Halleholm.

Pilegarden is a loading place on the W side of the fjord and about 0.34 mile W of Floberg Light. It has two small piers with depths of 4.5 and 5.2m, respectively, alongside. Vessels can anchor off Pilegarden in 27m, good holding ground.

Krokstrand is a loading place on the W side of Idefjorden and about 2 miles from its head. In the vicinity of Krokstrand are two quays, one of which has three projecting piers with depths of 4.9 to 5.5m alongside, and the other, about 30.5m long, has depths of 4 to 4.4m alongside. Three electric cranes are available. Vessels can anchor off Krokstrand in 6 to 9m, good holding ground. Pilotage is compulsory.

4.64 Channels north of Kirkoy.—Two channels connect Singlefjorden with Loperen and Osterelva. The S channel, which leads close N of the island Kirkoy is separated from Baevoytangleden, the N channel, by numerous rocks and islets.

Bjorneskjaer (59°05'N., 11°08'E.), a small islet marked by a beacon, lies on the W side of Singlefjorden about 2 miles

NNW of the light on Kattholmen. The S channel can be approached by passing either S or N of Bjorneskjaer. A number of dangers, some of which are not marked, lie in the approaches to this channel.

Temeskjaer Light stands on the S side of the channel nearly 1 mile W of Bjorneskjaer. A few beacons mark the channel, but because of the numerous unmarked dangers, local knowledge is essential.

4.65 Baevoytangleden, the N channel, commences immediately N of Bjorneskjaer and is deeper and more easily navigated than the S channel.

Ostre Bjorneskjaergrunnen, a reef awash, lies close NNE of Bjorneskjaer and is marked by a perch. About 0.5 mile farther NNE of Bjorneskjaer is **Kalvkosten** (59°06'N., 11°08'E.), a 0.9 patch marked by a perch. An 11m patch lies in the fairway 0.125 mile NE of Ostre Bjorneskjaergrunnen.

Vestre Bjorneskjaergrunnen, a reef awash, lies nearly 0.25 mile NW of Bjorneskjaer and is marked at its N end by a perch. below-water rocks with a least depth of 0.9m lie up to about 183m farther NW of Bjorneskjaer.

Mefjordholmen (59°06'N., 11°07'E.), about 1 mile NW of Bjorneskjaer, is fringed by a reef which extends about 0.2 mile N from its N end.

Singloya Light is shown on the W side of Singloy in a position about 1.25 miles N of Bjorneskjaer.

Lina, an islet fringed by a reef, lies on the SW side of the channel and about 0.5 mile N of Mefjordholmen. A reef lies awash close SE of Lina.

Lauskjaer Light is shown near the NE edge of the reef fringing Lina and in a position about 0.34 mile WNW of Singloya Light.

Between the N end of Lina and **Svalskjaerene** (59°07'N., 11°03'E.), a group of awash rocks lying about 2 miles W, the S side of Baevoytangleden is bordered by a chain of islets and awash and submerged rocks. Svalskjaerene is marked on its W side by an iron perch. A 2.7m patch lies about 0.15 mile NW of Svalskjaerene.

4.66 Galgeholmane and Toseskjaerene are groups of islets and awash and submerged rocks lying on the N side of the channel and within about 1 mile W of Singloy. **Galgegrunnen** (59°07'N., 11°07'E.), awash, lies nearly 0.5 mile NNW of Lauskjaer Light and is marked by two perches; a 3.7m patch, marked by a buoy, lies about 0.34 mile NW of the same light. A black beacon stands on the S farthest islet of Toseskjaerene in a position about 1 mile WNW of Lauskjaer Light.

Baevoyksjaerene is several islets and rocks lying on the N side of the channel and about 1.5 miles WNW of Toseskjaerene. Baevoyksjaerbaen, at the S extremity of the group, has a depth of 1m and is marked by a perch.

Ramsøy (59°07'N., 11°01'E.) lies on the S side of the channel and about 3 miles W of Lauskjaer Light. This island is fringed by a reef on its E and NW sides, but it is steep-to on its W side.

Ramsøy Light is shown on the N end of Ramsøy Island and Ramsøy West Light is shown about 0.25 mile SSW of the N light.

A black beacon with a white band stands on Borresen, an awash rock lying about 0.5 mile NNW of Rainsoy Light. A 5.9m patch lies nearly 0.2 mile SSE of Boffesen.

Alfegrunnen, situated 0.5 mile W of Boffesen, is a 3m shoal marked by a buoy at its N and S end.

Nordre Fugleskjaergrunnen, a patch with a depth of less than 1.8m, lies nearly 1 mile W of the N extremity of Ramsøy. A buoy mark the S end and the NE side of this patch.

Westward of Norde Fugleskjaergrunnen and Alfegrunnen, Baevoytangleden joins the main S approach to Fredrikstad and Sarpsborg.